Founded in 1832

RAILWAY OCOMOTIVES

ANDARS

JUNE 1954

FOR OFFICERS AND SUPERVISORS RESPONSIBLE FOR DESIGN, CONSTRUCTION AND MAINTENANCE OF MOTIVE POWER AND ROLLING STOCK

formerly

echanical and
Electrical Engineer

Disc Brakes— Iow They Work

gnitron Cars for Commuter Service

Diesel Wheel Iaintenance

One-Way and No-Go Locomotives

Santa Fe Full Length Dome Cars

Maintaining Diesel Electrical Equipment

Let's Keep Them Ip-to-Date

What About the Gas Turbine?



LADDERS and HANDHOLDS

THE WINE RAILWAY APPLIANCE CO. . TOLEDO 9. ONIO



fine, new
water-mixed
material
cleans
diesel engine rooms
and diesel exteriors
quickly, safely





OAKITE COMPOSITION No. 72 will definitely give you faster, better, safer cleaning results. What's more with this ONE cleaner you can clean diesel engine rooms and diesel exteriors. You can't help but save money with this double-purpose cleaner Oakite Composition No. 72.

Hear what satisfied users are saying about Oakite Composition No. 72:

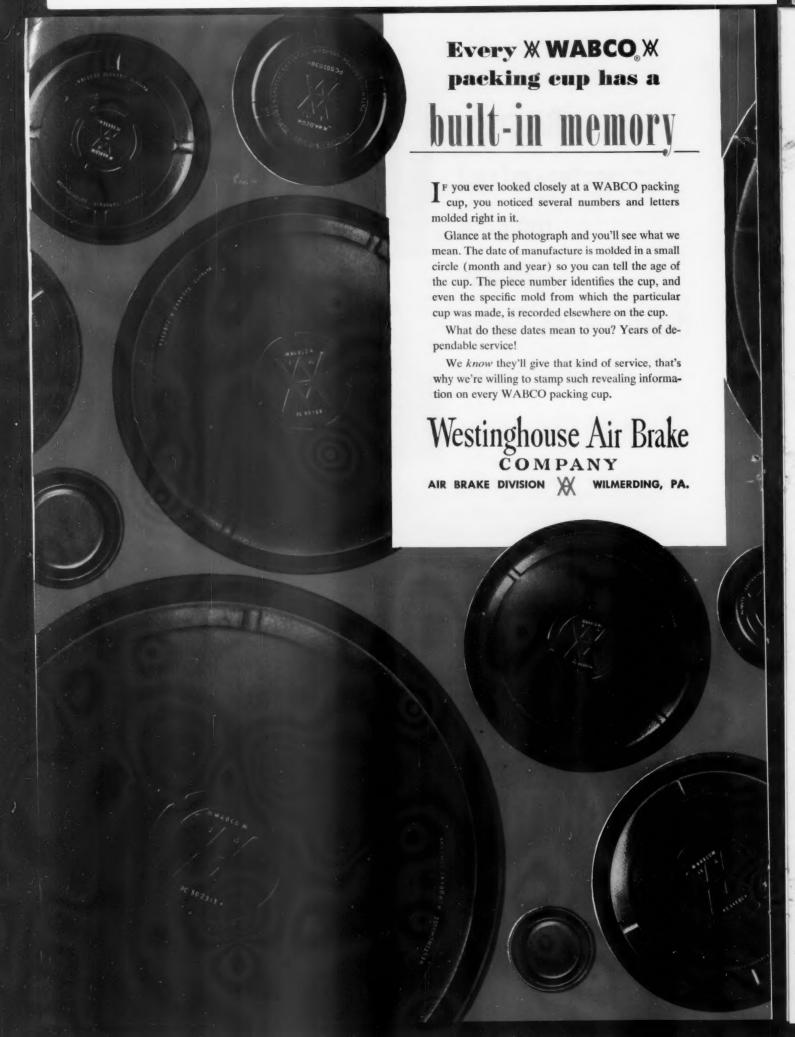
"This material is the one we've been looking for...that can be used with water instead of fuel oil or kerosene" (Interior diesel cleaning)

"Results perfect . . . diesels look almost like new" (Exterior diesel cleaning)

"Have never seen the equal of this material for removing oil and grease" (Interior diesel cleaning)

FREE SERVICE REPORT GIVES DETAILS. If you are looking for a quicker, safer way to clean your diesel interiors and exteriors. If you want to save money... take this first big step... send for FREE Service Report B-2837. It gives you a complete description of Oakite Composition No. 72. Tells you how to apply it manually for interior cleaning and mechanically for exterior washing. Just drop a line to address below for your copy. No obligation.





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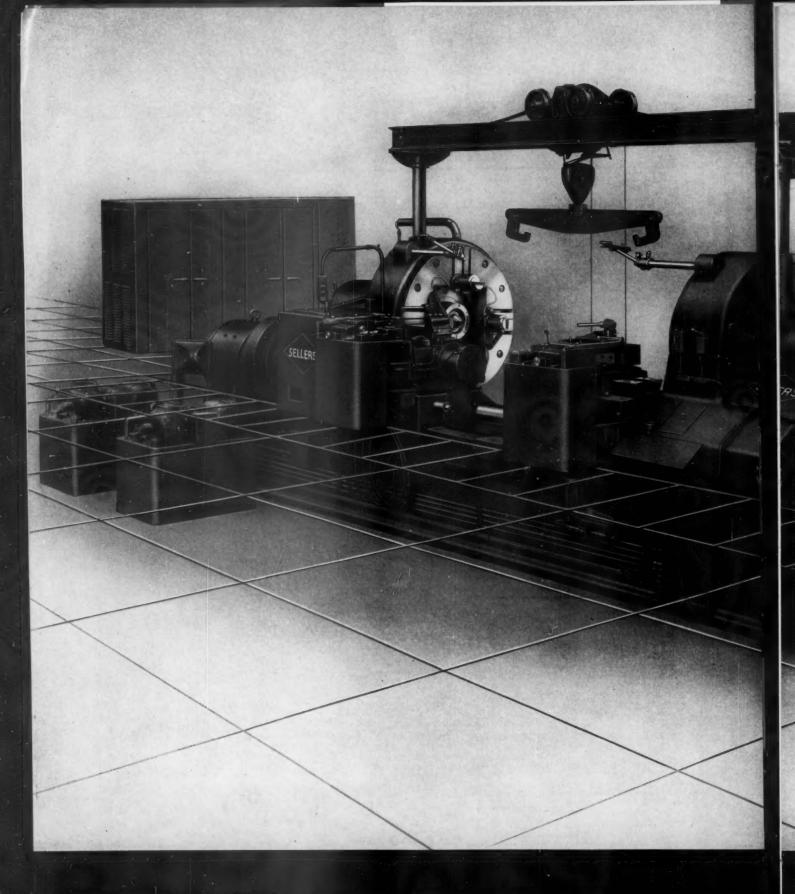
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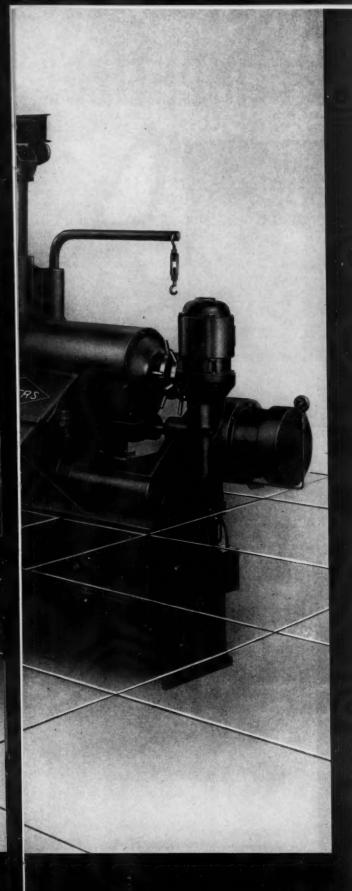
EDITOR'S DESK			50
EDITORIALS:			
Safe Shipment of Dangerous Con	nmod	ities	52
New Tight Gear Cases Pose Lubri			52
Journals Still Running Hot			54
LETTERS TO THE EDITOR			54
MOTIVE POWER AND CAR:			
Three-Level, Full-Length Dome			55
Disc Brakes—How They Work—			57
Where the Gas Turbine Locomot			70
New York Central Diesel Wheel	Mulin	tenunce	, ,
ELECTRICAL SECTION:			
Let's Keep Them Up-to-Date			75
Repairing Battery Sealing Compe	ound	**********	76
One-Way and No-Go Locomotive	s		77
M.U. Cars to Improve New Have	n Co	mmuter Service	78
A 200,000-Kw Generator			80
Maintaining Diesel Locomotive I	Electr	ical Equipment—Part II	81
No Slip or Slop on Snow-Free Sta	ps .		84
QUESTIONS AND ANSWERS			85
NE	W DI	EVICES:	
Chenille Roll-Type Journal-Box		Diesel Fuel Injection Tester	97
Packing	89	Dry Fire Extinguisher For Motors	
Flange Lubricator	89	Cooling Control for Welding Rectifier	11:
Silver Plate by Dip or Swab	89	Diesel Fuel Additive	11:
Freight Car Snubber	92	Abrasive Cut-off Saw	110
Mechanically Agitated Cleaning Machine	92	Pressure Type Fire Extinguisher	12
NEWS		*******************	9

INDEX TO ADVERTISERS 124



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Wholly owned subsidiary of Farrel-



SELLERS TRACER CONTROL WHEEL LATHE

The Sellers Tracer Control
Wheel Lathe is one of the most
outstanding contributions to
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Betts Mechanical Feed End Drive Burnishing Lathes

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P-S Compartmentizer

The P-S Compartmentizer lets many shippers load cars to the roof. For all kinds of shipments—car loads, LCL, or stop off. Below: Shipments to two or more stops enroute are easy for the P-S Compartmentizer. Shipments are segregated, chance of error, mix-up or damage reduced.





Two pairs of rugged steel gates close tight against the load, and each pair securely locks at 8 points. Locking and holding are positive. Gates can be locked in any position from door post to bolster at 3-inch intervals.



Each gate is independently suspended from an over head track running full length of the car. One man can easily move it into position snug against the load, for 4-position locking against ceiling walls and floor.

protects lading speeds handling

With such products as the Box Car Compartmentizer, Pullman-Standard has aligned itself with the nation's railroads and shippers in the fight against lading damage.

As the railroads strive to serve the shipper better and faster, Pullman-Standard engineers continue to offer strong support by developing box car damage prevention accessories that speed handling, reduce loss ratios. For example. Records prove the Pullman-Standard Box Car Compartmentizer allows cars to be loaded more efficiently, unloaded rapidly, even at two or more stops enroute. Consignee need not level off the load. Dunnage

is completely eliminated. Compartments prevent load mix-up, displacement, impact damage and crushing. Experience is enabling Pullman-Standard to constantly add further features to such equipment as the P-S Box Car Compartmentizer.

Other Pullman-Standard contributions to the battle against damage are the impact-neutralizing Cushion Underframe and the full length Lading Strap Anchor.

Write for booklets describing the P-S Compartmentizer, P-S Cushion Underframe, P-S full length Lading Strap Anchor.

YOUR NEEDS CREATE THE PULLMAN "STANDARD"

PULLMAN-STANDARD

AR MANUFACTURING COMPANY

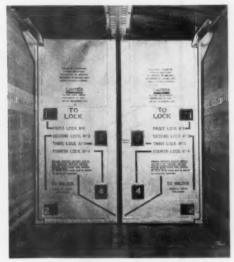
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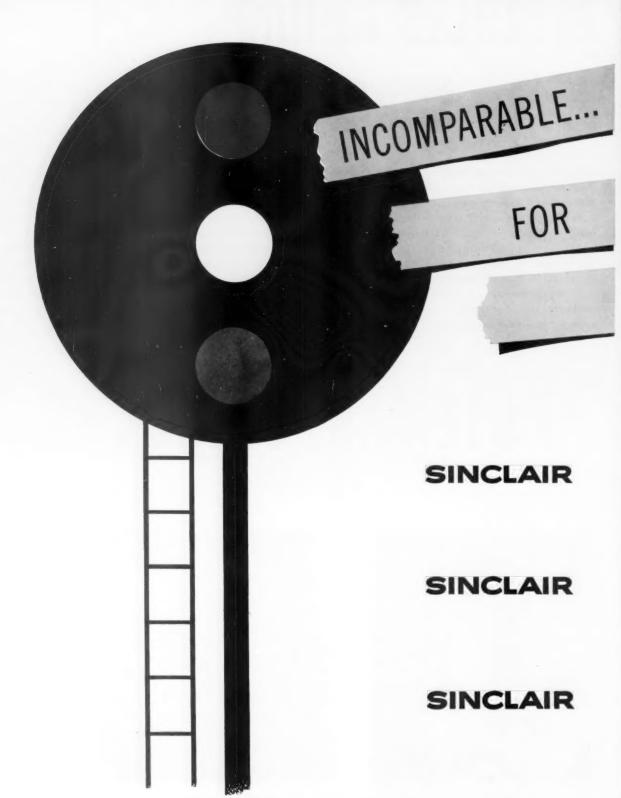
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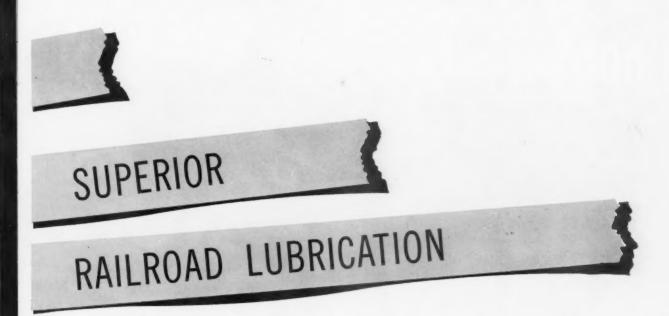
Damage is minimized when P-S Compartmentizer gates are secured. With gates closed against the load, the car is divided into three compartments. Any movement of the lading in one section cannot affect the contents of the other two.



Crated or cased goods, including sacked goods, packaged cereals, bottled goods, household appliances, glassware and medical supplies are only a few of the items that are traveling safely in the P-S Compartmentized Box Car.



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Sinclair GASCON® Diesel Lubricating Oils are used and preferred by more than 100 American railroads. Such a record is as outstanding as the quality of the oils themselves,

JET LUBRICANT TM

More than 70 railroads now use JET. Three years of heavy-duty testing give on-the-job proof that it is best for Diesel traction motor gears.

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In test after test, this lubricant for Diesel locomotive and car journal roller bearings is proving markedly superior.

COMPANYRAILWAY

NEW YORK . CHICAGO . ST. LOUIS . HOUSTON

40,000 hopper cars have been built



Here is why it pays to build with USS COR-TEN steel

Typical cost comparison for 1000 50-ton hopper cars using COR-TEN steel and copper steel in AAR Standard thicknesses

CONSTRUCTION COST OF 1000 CARS	Cost of heavy repairs after 12 years at \$1200 per car	Cost of heavy repairs after 18 years at \$1370 per car	Cost of heavy repairs after 24 years at \$1200 per car	Total cost of heavy repairs
Copper Steel at \$5,000 per car \$5,000,000	\$1,200,000		\$1,200,000	\$2,400,000
COR-TEN steel at \$5,170 per car \$5,170,000		\$1,370,000		\$1,370,000
Additional cost of COR-TEN steel . \$170,000 Per car \$ 170	Additional cost of Not Repair Savir	of COR-TEN steel con ing by COR-TEN steel.	struction	\$ 170,000

• Here being assembled are a few of the 5,500 70-ton hopper cars built by American Car & Foundry Co. for the Chesapeake & Ohio in 1950-51. High strength steel—mainly USS COR-TEN steel—was used for all body parts in contact with the lading.

USS HIGH STRENGTH STEEL

Ratio of Net Saving to Additional Cost.....

better with USS COR-TEN steel since 1933

COR-TEN steel construction pays for itself many times over

It costs about \$170 more to build a 50-ton A.A.R. hopper car with body sheets of high strength, corrosion-resisting USS Cor-Ten steel of the same thickness as would be used in copper steel.

But this money is well spent—the use of Cor-Ten steel actually pays for itself many times over. First by saving the cost of one heavy repair and second by saving the time out of service such a repair involves.

COR-TEN steel construction cuts heavy repair costs 42%

USS Cor-Ten steel construction in hopper cars will last at least 50% longer than copper steel of the same thickness. Thus during the 36 years' normal life of a hopper car, a copper steel car will require *two* heavy repairs—one at the end of 12 years and another after 24 years' service, each costing about \$1200, or \$2400 in all.

In contrast, a Cor-Ten steel car will require heavy repairs only once, at the end of 18 years at a cost of \$1370. Subtract from this saving of \$1030, the \$170 extra cost of Cor-Ten steel construction and you have a net saving of \$860—more than five times the extra first cost of Cor-Ten steel construction.

COR-TEN steel construction cuts out-of-service time in half

These savings are further increased by the extra earning power that results from keeping cars serviceable—from having only one heavy repair in the life of the Cor-Ten steel car.

This can run into important money, for railroads tell us that many cars spend six months to a year, or even longer, waiting for enough cars to come in for repair to permit setting up a track for economical shop practice.

How many months do bad order cars lose on your rail-

road? With this figure in mind, consider the fact that the per diem that a freight car earns in only 71 days will pay the extra cost of applying Cor-Ten steel instead of copper steel in a 50-ton hopper car.

Now, ask yourself, does Cor-Ten steel construction justify its extra cost? We believe that your answer—like that of the present users of the 40,000 USS Cor-Ten steel hoppers—will be an emphatic, "Yes."

UNITED STATES STEEL CORPORATION, PITTSBURGH . AMERICAN STEEL & WIRE DIVISION, CLEVELAND . COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
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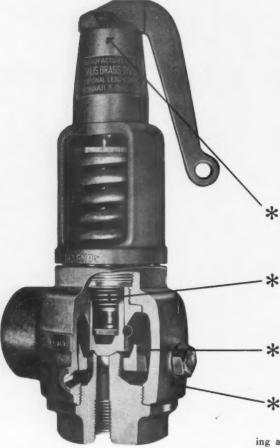


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UNITED STATES STEEL

Here's REAL SAFETY for

diesel locomotive steam generators



MAGNUS 391 SAFETY VALVE...

the standard for many roads because of these important advantages

Easy, accurate adjustment for opening pressure, from 245 to 300 psi, located under protective cover to prevent accidental change of setting.

Special alloy metallic bellows prevents any steam from escaping into the steam generator compartment.

Blow-down pressure ring easily adjusted and permanently locked in any position.

Valve body of high strength Navy M bronze.

With Safety Valves you've got to be sure. You don't need them often, but you have to know they will work when you do need them.

That's why railroad after railroad is standardizing on Magnus 391 Safety Valves. Specially designed for steam generators, these rugged, durable valves have what it takes. The valve spring is a high-grade vanadium steel. Valve body and seat are silver-nickel-bronze alloy—specially machined and ground to avoid singing and chatter-

ing at any pressure. It's the only valve with a metallic bellows to prevent escape of steam into the steam generator compartment.

You can't beat Magnus valves for economy either. They can usually go for a year or more before any servicing will be needed. And individual parts, including main body parts, can be easily renewed at overhauls.

All Magnus valves are thoroughly tested and properly adjusted under steam pressure before they leave our plant. Blow-down normally set for 4% below opening pressures. For complete information write to Magnus Brass Manufacturing Company, 525 Reading Road, Cincinnati 2, Ohio.

other Magnus Brass products for diesel locomotives



D-16 FLANGE LUBRICATOR

Increases mileage between wheel turnings up to 40%—saves on shop expense and "down time"—saves with longer wheel life, too.



SIGHT GAGES FOR DIESEL FUEL TANKS

Flexible mounting to fit all standard diesel fuel tanks. Leakproof and practically indestructible.



Subsidiary of NATIONAL LEAD COMPANY

525 Reading Road, Cincinnati 2, Ohio



STRIPS as many as 20 coats of paint in <u>six</u> to <u>nine</u> minutes . . . <u>saves up to 97%!</u>

Large and small railroads alike are already doing an amazing paint stripping job with New Wyandotte-21. You can, too! We'll show you HOW. Mail coupon for free sample and test data, today. Don't delay! Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Angeles 12, California.



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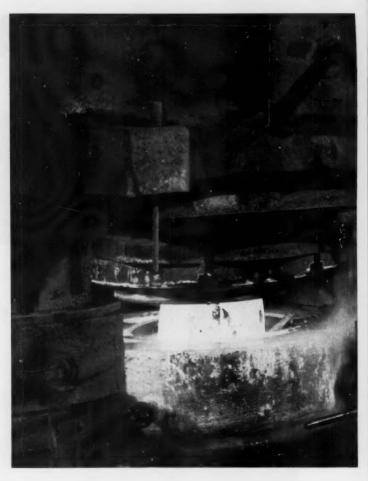
"THE BIG COULTETT" JULIE



WROUGHT STEEL WHEEL

That block of hot steel is under 14,000,000 pounds pressure! Yet, only a few effortless seconds are required for the huge press to descend and rise—just a few seconds, and a red-hot wheel blank is hoisted from the die. Thus, the first forging takes place in the life of a USS Wrought Steel Wheel.

Basically, steel possesses the inherent properties of hardness to resist wear, strength to withstand heavy loads, and ductility to minimize sudden brittle fractures. This excellent combination of properties is improved by forging, rolling, and controlled-cooling, imparting to the finished Wrought Steel Wheel an extremely high degree of soundness and dependability.



But what does the Wrought Steel Wheel do for you?

- IT LASTS LONGER... USS One-Wear Wrought Steel Wheels will average 200,000 to 300,000 miles or more in normal freight car service.
- IT COSTS LESS... Its far greater life in any given service will reflect a substantially lower cost than that of the ordinary wheel, even though, initially, the One-Wear Wrought Steel Wheel costs a little more than the ordinary type wheel.
- REQUIRES LESS MAINTENANCE . . . Rolling on One-Wear Wrought Steel Wheels, a car spends more time in service, and less time on repair sidings, resulting in increased revenue to the railroad. Also, less frequent repair means reduced maintenance and lower labor costs.
- SAVES UNSPRUNG WEIGHT... Because they are lighter than ordinary wheels, eight Wrought Steel Wheels under a 50-ton capacity car will save approximately 1,520 lbs. of unsprung weight, which can be directly converted into payload capacity—or result in a fuel savings due to the decreased load. Furthermore, reduced unsprung weight means less pounding on the track system.

Two strategically located complete wheel shops are ready to fill your orders for *Wrought* Steel Wheels: McKees Rocks (Pittsburgh), Pennsylvania, shop, serving the East and Southeast, and the Gary, Indiana, shop supplying the Western and Southern Lines.





USS WROUGHT STEEL WHEELS

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TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.



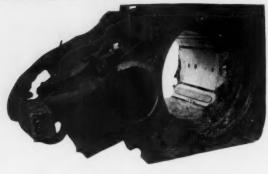
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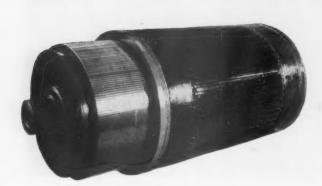
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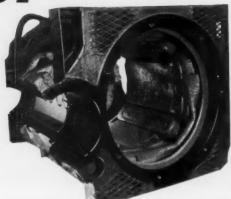
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IN ONE MINUTE'S TIME

AWS Class E-6012 electrode produced this fillet

THIS MUCH MORE WELD

was made in the same time in the same steel plate

with the new



EASYARC 12

Airco's new EASYARC 12 actually welds mild steel in about half the time it takes with conventional AWS Class E-6012 and E-6013 electrodes. EASYARC 12 has a completely new type of flux coat that contains a high proportion of powdered metal. This lets you use higher currents without breakdown of the coating, and vastly increases deposition rates, since the flux itself adds metal to the weld.

Besides being fast, EASYARC 12 is far easier to handle. Welds are made by "dragging" the electrode along the joint. Spatter is almost negligible. And EASYARC 12's slag is practically self-cleaning.

For complete information and prices — get in touch with your Airco office right now.

Actual length of welds: E-6012 - 5-1/16", Easyarc 12 - 12". Current settings: 230 amps AC for E-6012; 275 amps AC for Easyarc 12. Both welds made in 1/4" plate with 3/16" dia. electrodes.

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at the frontiers of progress you'll find





Alco All-Purpose Locomotives work in many types of service on the Pennsylvania Railroad.

SPEED, POWER, Versatility

...the big three in today's locomotives

Modern railroading demands more in a locomotive than just speed and power.

Needed, too, is versatility-for better utilization.

That's why, back in 1940, Alco introduced a new concept in railroad motive power — the diesel-electric all-purpose road switcher.

Road switchers combine the superior visibility of standard switching units with the speed, tractive effort and riding qualities of road freight-passenger units.

They haul the fastest, heaviest mainline freight and passenger trains. They handle transfer, branch-line and yard-switching assignments. And they're easily adaptable to humping service.

Thus they virtually eliminate idle motive power.

Today, thousands of Alco all-purpose locomotives are cutting costs and boosting efficiency on railroads all over America—further evidence of Alco's better motive power for greater earning power.

ALCO

AMERICAN

ALCO ALL-PURPOSE LOCOMOTIVES

For Greater Earning Power Through Higher Utilization

Alco All-Purpose Locomotives haul more tons per train in fast freight and passenger runs . . . handling all transfer, branch-line and yard-switching assignments . . . permit utilization of 95 per cent or better. And that's only the beginning.

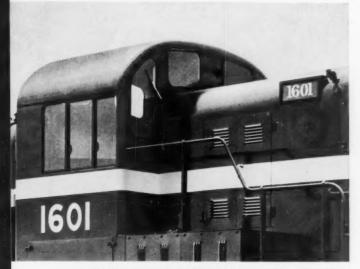
For more "workpower" per locomotive means not only lower operating costs . . . but also lower first costs.

Example: an Alco All-Purpose 1600-hp 4-motor unit will handle, among its many other assignments, essentially the same mainline service as a standard 1600-hp road freight unit — at a first cost saving of more than \$10,000.

Another point to remember: hauling more tons per train, Alco All-Purpose Locomotives make possible significant savings, per ton hauled, in fuel, maintenance, lubrication, and labor.

Get the complete story on this better motive power for greater earning power in terms of your own operations. Call your nearest Alco locomotive representative soon.

(Condensed Specific	ations	
	6-MOTOR ALL-PURPOSE UNITS	4-MOTOR ALL-PURPOSE UNITS	
Weight	stepped weights from 280,000 lb to 360,000 lb	stepped weights from 240,000 lb to 258,000 lb	
Length (inside knuckles)	56 ft 5¾ in.	56 ft 5¾ in.	
Height	14 ft 81/4 in.	14 ft 51/a in.	
Width	10 ft 1% in.	10 ft 01/4 in.	
Wheel base	42 ft 3 in.	39 ft 4 in.	
Each truck (rigid)	12 ft 6 in.	9 ft 4 in.	
Engine One Mod	el 244 turbosupercharged,	4-cycle, 12-cyl 1600 hp	
Dynamic braking capacity	2900 hp	1900 hp	
Trucks	3-axle, 6-wheel	2-axle, 4-wheel	
Driving motors	6	4	
Wheel diameter	40 in.	40 in.	
Maximum speed	65 mph	92 mph	
Continuous tractive effort (65 mph gearing)	79,500 lb	53,000 lb	
Starting tractive effort (25% adhesion)	70,000 lb to 90,000 lb depending on weight	60,000 lb to 64,500 lb depending on weight	



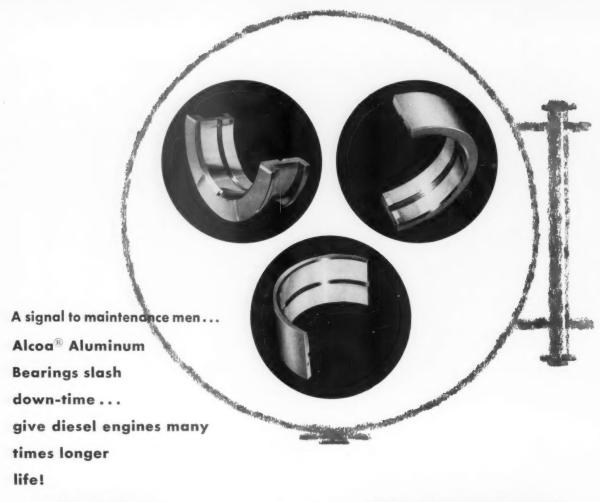
EXCEPTIONAL VISIBILITY combined with high tractive effort and full horsepower at high speeds makes Alco 4-motor and 6-motor All-Purpose Locomotives the most versatile motive power on the rails today.

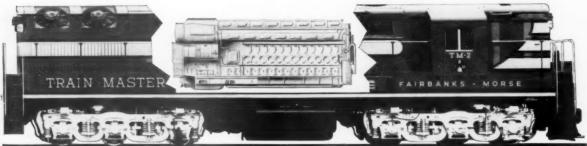
Special Features of Alco All-Purpose Locomotives

- FULL-RATED HORSEPOWER at high speeds and at standard altitude conditions up to 5,000 ft — for faster schedules, heavier payloads.
- 4-CYCLE TURBOCHARGED ENGINE for greater fuel economy, better scavenging, better cooling of valves and valve seats.
- * MAXIMUM SPEEDS up to 92 mph.
- HIGH-CAPACITY DYNAMIC BRAKING automatically controlled — for greater speed control on flat terrain, greater holding power on grades (optional).
- SUPERIOR TRACTION MOTORS for higher continuous tractive effort . . . 53,000 lb for 4-motor, 79,500 lb for 6-motor with 65 mph gearing.

LOCOMOTIVE COMPANY

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Fairbanks-Morse have used Alcoa Aluminum Bearings for years in earlier model diesel engines. The extra-long service life they have received from these bearings convinced them that aluminum is the *right* bearing metal.

That's why, when they brought out their great new Train Master Locomotive, Fairbanks-Morse specified Alcoa Aluminum Bearings for the complete engine set. Over one hundred aluminum half-shells in each engine! Fifty-two bearings—including mains, connecting rods and thrust bearings—are all Alcoa Aluminum.

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ALUMINUM COMPANY OF AMERICA



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	Please send me, free of charge, my copy of Boolet on coupler reclamation.	
OXWELD RAILROAD SERVICE COMPANY	Name	
A Division of Union Carbide and Carbon Corporation [144] Carbide and Carbon Building Chicago and New York	Railroad	
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Canadian Railroad Service Company Division of Union Carbida Canada Limited, Teronto	CityZoneState	

The term "Unionmelt" is a registered trade-mark of Union Carbide and Carbon Corporation.

BRAND NEW ORE-HAULING OPERATION

USES LOW-COST SOLID BEARINGS

for ALL CARS AND LOCOMOTIVES

U.S. Steel's Orinoco Mining Company standardizes on solid bearings with "Twinplex Alarm" and "Kool-End" features for all equipment in year-round non-interchange ore movement.

Down in Venezuela, a new ore-gathering system has just been completed by Orinoco Mining Company, covering 90 miles from ore fields in the Cerro Bolivar area to ore-conditioning plant and docks at Puerto Ordaz. Initial equipment orders called for 560 100-ton cars and 9 1600 h.p. B-L-H diesel-electrics—100-ton cars and 9 1600 h.p.

Orinoco chose solid bearings principally because of their low initial cost and the ease and economy with which they can be maintained. Dimensionally, the car journal bearings conform to standard AAR specifications for $6\frac{1}{2}$ " x 12" journals. They differ in that each is equipped with smoke and odor alarm cartridges for

early detection of any overheated condition before it can become serious. The car bearings also have "Kool-Ends"—a thicker babbitt surface for both contact ends to reduce journal friction and provide cooler operating temperatures.

ATA Bearing Design for Locomotives.

Orinoco diesel-electrics use an ATA journal bearing design. These bearings are interchangeable with standard AAR bearings but different in that there's a deep side wall construction, providing greater journal-to-bearing contact area and preventing journals from rolling out from under the bearings. ATA bearings hug the journals—even during impacts such as occur whenever cars are "bunched" for any reason. Like the car bearings, these locomotive journal bearings also have "Twinplex" smoke and odor cartridges and "Kool-Ends."

Freight Car Bearing Performance

The figures at the right clearly indicate a trend to improved journal bearing performance, even with today's faster train speeds and heavier loads.

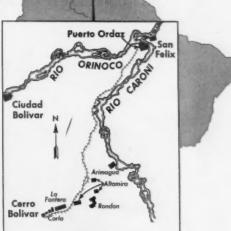
Higher standards of maintenance and inspection, combined

Higher standards of maintenance and inspection, combined with selective adoption of available developments, can continue to improve solid bearing performance — to the point where the incidence of hot boxes may be reduced to insignificance.

PERIOD	CAR MILES	CAR MILES	% INCREASE OVER 1951
1951	34,726,490,070	172,703	_
1952	34,313,975,558	190,109	10%
1953	34,355,017,965	219,762	27%

now under way in Venezuela





Map showing rate of ore cars from mine area to ore conditioning plant and part at junction of Orinoco and Caroni Rivers. Quinoco River was dredged to this point to permit operation of sea-going vessels, Total length of system is about miles—with heavy movement down grade.

At left is car journal bearing like those applied to Orinoco cars. Size is 6½" x 12"—keeping maximum bearing loads well within recommended limits.



How Twinplex Alarm Bearings Work.

Twinplex Alarm Bearings provide a positive means of early detection of any overheated bearing condition. The smoke and odor cartridges are inserted in holes drilled longitudinally through the bearing back. Each cartridge is sealed with fusible metal that melts if temperatures of 350° F. are reached for any reason. When this happens, for a period of about 8 minutes one cartridge releases a heavy pungent odor (ethyl mercaptan) and the other a dense white smoke.

Ask us to give you complete details about Twinplex Alarm Bearings and other Magnus developments for improved freight car performance. Just write to Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

First of 9 B-L-H 1600 h.p. diesels with which Orinoco is beginning operations. Note six wheel trucks have standard boxes for solid bearings.

MAGNUS

Solid Bearings

Right for Railroads

...in performance ...in cost



MAGNUS METAL CORPORATION Subsidiary of NATIONAL LEAD COMPANY

METAL LONDID TO PLYWOOD OD VERSATILITY FOR MODERN



Met-L-Wood walls provide a smooth, luxurious finish in addition to saving weight and simplifying construction.

Panel Intersection Connections
Anti-Sque ok

Connection

Connection

Competition

Connection

Competition

MET-L-WOOD passenger car partitions, doors and paneling not only produce beautiful finished surfaces, but can also save up to 73%* in weight and a substantial amount of construction time. Shown at left, and described below are typical Met-L-Wood construction details. Full information on Met-L-Wood versatility in new or rebuilt cars will be furnished promptly on request. Write today.

CAR INTERIORS

Panel intersections with Met-L-Wood can be made invisible from outside with the use of split rivets. Floor connections may be made in a variety of ways, one of which is shown here, using through-rivets and metal screws.

2 Interior doors of Met-L-Wood can be fitted with aluminum extrusion door stops; or the Met-L-Wood partition formed so that the door stop is an integral part of the panel.

Steel tapping plate inserts can be put in Met-L-Wood doors at proper places for solidly anchoring hinges and door-opening devices. Note simplicity of using zipper-type window sash with pre-formed Met-L-Wood window openings.

A Square or rounded corners are made with Met-L-Wood panels and steel or aluminum corner forms. Corner forms can also be fastened with split rivets or through-rivets, as well as with wood or metal screws.

*Met-L-Wood panels 3/8" thick, with steel both sides, bave a stiffness factor exceeding that of 1/4" solid steel plate, while weighing only 27% as much as steel!



MET-L-WOOD CORPORATION

6755 West 65th Street, Chicago 38, Illinois

MET-L-WOOD . STRONG...LIGHT...Smooth Finish...Sound Deadening...Fire-Resisting...Insulating

How all industry benefits from progressive railroading

They're bringing older cars up to modern riding standards

Today, thousands of older freight cars are carrying your merchandise far more smoothly! One reason: railroads are making huge annual investments to modernize existing rolling stock.

To fully appreciate the real problems involved, consider just a few stark realities of freight train operation. Each railroad deals not with one plant or a dozen products, but with thousands of cars. These cars necessarily have to earn their way in just a few hours every day—and on the average, up to 70% are in interchange on other roads!

Nevertheless, many improvements are being made. For example, hard-riding springs are being replaced with the Ride-Control® Package, developed by American Steel Foundries. Packages make the older cars available for unrestricted use at today's higher speeds; another way of saying a smoother-riding car where you want it and when you want it.

Such improvements, of course, have to be practical economically as well as mechanically. That's the yardstick railroads use. And that's why they offer you better freight service . . . at a bigger value than ever before.

unit that allows soft-riding springs to be applied to older cars—at costs in keeping with the economics of freight car operation.

ASF Ride-Control Package, the compact

American Steel Foundries

Norld's largest producers of railroad running gear

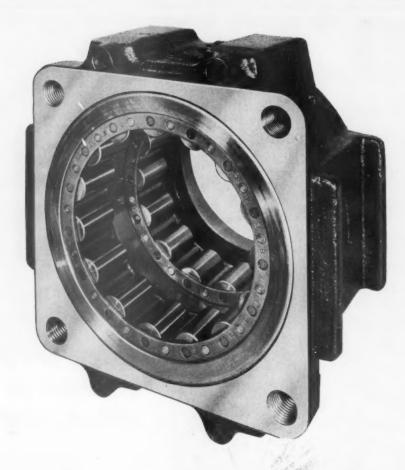
Executive Offices: Wrigley Building, Chicago 11

Lading damage index plummets when old springs are replaced by the Package. Comparison is from a typical "before and after" test—i.e., same car, carrying same load on same track.

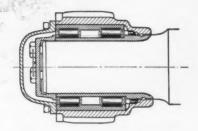


Today's modern freight car pool carries more freight with 25% fewer cars, averages more than 50% higher speeds. And, reported car shortages are down 84% since 1950!





This is the Bower-Franklin Roller-bearing journal box for freight cars



The straight roller bearings for this freight car journal box are made by the Bower Roller Bearing Company of Detroit. The inner race fits standard AAR roller bearing axles. Two rows of straight rolls, running between the inner and outer races are positioned by a sturdy retainer. The one-piece outer race is contained in a separate, ruggedly built journal box housing. The bearing permits free

lateral movement of the axle up to 1/2 inch.

Another point to remember about Bower Franklin bearings is that they permit bearing interchange with minimum parts inventory. Complete box and bearing units slip off the axle without disturbing the inner race. No need to carry spare wheel sets with bearings and boxes applied. Ask us to send you complete facts today.



FRANKLIN BALMAR CORPORATION

WOODBERRY, BALTIMORE 11, MARYLAND CHICAGO OFFICE: 5001 North Wolcott Ave., Chicago 40





Carbon comes out of combustion chambers in a hurry with this NEW 1/4" Drill shown here equipped with wire brush. It's lightweight, compact, ideal for mechanics' tool kits. Ask for the NEW Sioux Model No. 1475!



There's an answer for those hard to get at places in automotive, aircraft, and industrial work—it's the popular Sioux ¾" all-angle Drill, designed especially for working in close quarters.



SIOUX
all the
way through!

Electric Drills, Sanders, Polishers, Bench Grinders, Portable Grinders, Valve Seat and Face Grinders, Electric Hand Saws, Flexible Shafts, Abrasive Discs.

Sold only through authorized SIOUX distributors

TSON & CO., INC.

JUNE, 1954 - RAILWAY LOCOMOTIVES AND CARS

faster, smoother

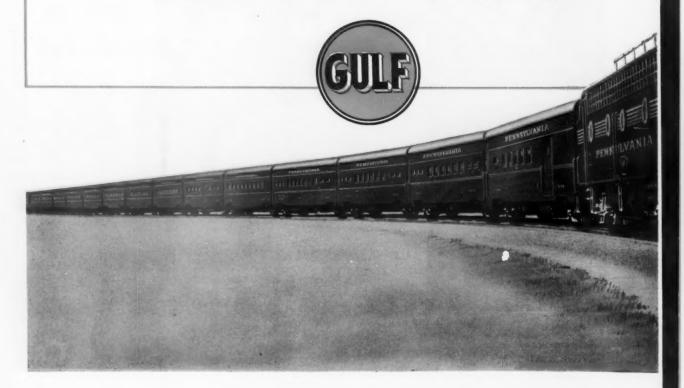
The watchwords of today's American railroads—faster, smoother travel—are typical of the Pennsylvania Railroad's stream-liner, the Spirit of St. Louis, which makes the trip between St. Louis and New York an enjoyable experience for the traveler.

Gulf Dieselmotive Oil contributes to the fine performance of the giant Diesel engines that power the Spirit of St. Louis and many other crack trains. Here's how this top quality Diesel locomotive lubricant helps keep maintenance costs down, availability up:

- 1 Effective detergent action prevents harmful piston ring belt deposits.
- 2 Base stocks are selected for their ability to help prevent hard deposits on the piston crown and in the ring belt area.
- 3 100% solvent refining (removing undesirable constituents) insures greater stability and better bearing protection.

Gulf Sales Engineers, experienced in railroad Diesel operation, are always available to aid you in maintaining high standards of lubrication throughout your system. Write, wire, or phone your nearest Gulf office today, and have a Gulf Sales Engineer call.

Gulf Oil Corporation . Gulf Refining Company . 1822 Gulf Building, Pittsburgh 30, Pa.



than ever before-

THE TRAIN

the Pennsylvania's crack

"Spirit of St. Louis"



Gulf Dieselmotive Oil



QUICKEST.





5 BILLION MILES PER YEAR

of smooth, trouble-free service provided by . . .

350,000 CAR SETS

of Barber Stabilized Trucks now in operation with...

OVER 100 MAJOR RAILROADS

and private car lines.

Dismantling, Servicing and Assembling

Snap your fingers at the high cost of dismantling . . . if they're Barber Stabilized Trucks. It takes two men 15 minutes to raise the bolster from the springs, which instantly releases the Stabilizer parts for removal. No bars, or prying needed. No additional helpers. No costly labor operation.

Skillful design is immediately evident. The Barber Truck is astonishingly simple in principle, yet it is highly effective in smoothing out a freight car ride. Its parts are sturdy; its performance long and satisfactory. The Barber Truck... first to introduce built-in stabilizers... does its intended job well, with the fewest possible parts. Standard Car Truck Company, 332 S. Michigan Ave., Chicago 4, Illinois.





BARBER

STABILIZED TRUCKS

KEEP MORE PASSENGERS COMFORTABLE

... with bright, steady lights and cool cars!



COMFORTABLE passengers are satisfied customers. Exide-Ironclad batteries insure ample power for bright, steady lights and comfortable cars even during long stops. Built to withstand hard, continuous service, they give you worry-free performance, maintain high, uniform voltage under all operating loads. Lower costs for operation, maintenance and depreciation make Exide-Ironclad batteries your best power buy—AT ANY PRICE!



THE POSITIVE PLATES are the heart of any battery. Only Exide uses a slotted tube construction. By use of tubes, more active material is exposed to the electrolyte, providing greater power. Also, more active material is retained, giving longer working life.



IMPROVED Exide-Ironclads now have power tubes made from non-oxidizing plastic for longest battery life, more capacity in the same space. For full details, call your Exide sales engineer—write for Form 5010 (Installation and Maintenance of Car Lighting and Air Conditioning Batteries).

Your best power buy ... AT ANY PRICE!



Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa. . Exide Batteries of Canada, Limited, Toronto

CONTINENTAL

CARBON AND ALLOY CARBUILDERS CASTINGS



Quality Castings that Save You Money!



Castings you get from Continental reflect the same facilities and skill that produce huge, intricate castings for rolling mills and other machinery bearing the Continental name. Their precise accuracy and quality of finish save you money in the long run.

COMPLETE ROLLING MILLS · ROLLS STEEL CASTINGS · WELDMENTS BOILER CONTROLS AND CLEANING



Plants at

East Chicago, Ind. • Wheeling, W. Va. • Pittsburgh, Pa.

Copes-Vulcan Division: Erie, Pa.

CHICAGO · PITTSBURGH







Why wheel shop men like chilled car wheels



The wheel that carries nearly two-thirds of the nation's freight cars. All AMCCW plants produce the improved car wheel with more brackets, to give thicker, heavier, more continuous flange support...and with a heavier tread on both rim and flange sides.

Wheel shop men can tell you quicker than anyone else how they can bore AMCCW chilled car wheels nearly twice as fast, with greater speeds and feeds...how they save time and reduce wear on expensive equipment...how they mount with a firm grip at only 50 to 60 tons pressure. Chilled car wheels are not only easier to mount, they make better safety records because iron likes to cling to steel.

That's why AMCCW wheels are the most popular ones in the wheel shop. Other economic advantages of the chilled car wheel are listed below. If you'd like to have the facts about today's chilled car wheel summarized for convenient reference, send for the free booklet, "The Chilled Car Wheel."

Low first cost * Low exchange cost * Available locally * Short-haul delivery * Reduced inventory * Increased ton mileage * High safety standards * AMCCW plant inspection * Easier shop handling

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

445 North Sacramento Boulevard, Chicago 12, III.



Albany Car Wheel Co. • American Car & Foundry Co.

Marshall Car Wheel & Foundry Co. • Griffin Wheel Co.

Pullman-Standard Car Mfg. Co. • Southern Wheel (American Brake Shoe Co.)

It began as an experiment—but paid off for everyone concerned. That's why

"Trailiner traffic increases 3200%

Anyone who doubts the future of trailers on flatcars should take a long look at the New Haven's Trailiner service. Starting in 1938—when 1,506 trailers were shipped—it has mushroomed to the point where seven separate Trailiner trains carried 50,255 trailers between New York, Boston, Providence, Springfield and New Haven during 1953.

Dependable schedules are maintained by a fleet of 360 specially designed and constructed flatcars—all mounted on ASF Ride-Control Trucks. Result? Trailer and lading get a safe, smooth ride at almost passenger-train speeds. Using Ride-Control Trucks, experience has shown that if a trailer load rides safely to the New Haven yards, it rides safely on the flatcars.

And everybody benefits. The New Haven builds additional revenue. The truckers enjoy relief from highway hazards...they get balanced distribution of empties at lowest possible costs...and

they've doubled the number of trailers used per tractor.

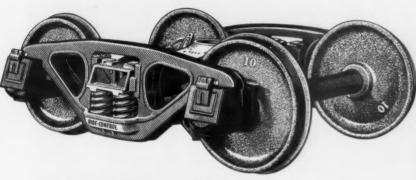
Today, Trailiner service is no longer an innovation. It's an outstanding example of progress... with two great transportation methods working together.



Trailiner flatcars receive greater utilization than practically any other freight cars in revenue service. The fleet of Trailiner cars will soon be enlarged with delivery of 100 new cars now on order. These new cars will also run on ASF Ride-Control Trucks—modified for use with roller beginns.



on the New Haven's Iron Highway



The "Trailiner" rides on



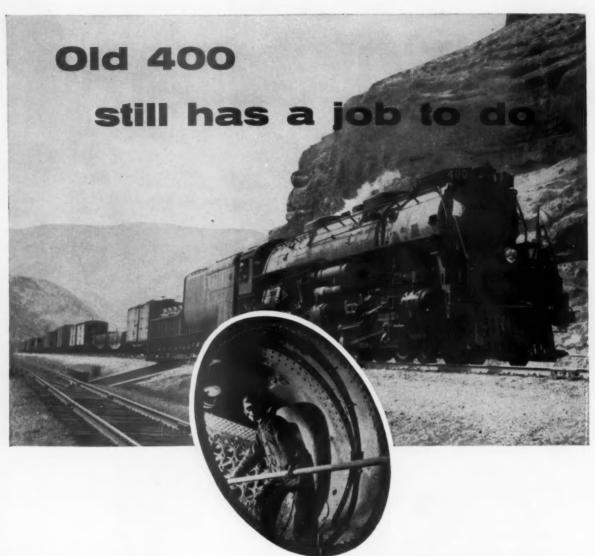
ride-control® trucks

AMERICAN STEEL FOUNDRIES

410 N. Michigan Avenue, Chicago 11, Illinois

Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec

1467



· Almost half of the locomotives in service on American railroads today are still powered by steam. Many of them owe their long lives, their dependable, year-after-year service to NATIONAL Seamless Boiler Tubes. The absolute uniformity and high wall strength of NATIONAL Seamless Tubes aided by their density and soundness assure complete reliability and safety, even under the terrific pressures and temperatures now being used. In fact, tube life has been prolonged to such an extent nowadays that on one road, eleven passenger units using NATIONAL Seamless

Tubes averaged more than 550,000 miles before retubing.

The secret of such outstanding boiler tube life under increasingly severe conditions lies in the method of manufacture—the Seamless Process. Every National Seamless Boiler Tube is actually pierced from a solid billet of highest quality steel. There is no longitudinal weld. This

"Walls Without Welds" construction is the one manufacturing method that removes all doubt concerning uniform wall strength, resulting in the strongest, most dependable boiler tubes made. So when you're planning to retube, plan to use the best—NATIONAL Seamless Boiler Tubes. Our distributors bend boiler tubes. We will be glad to furnish the name of the distributor in your territory, upon request.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.

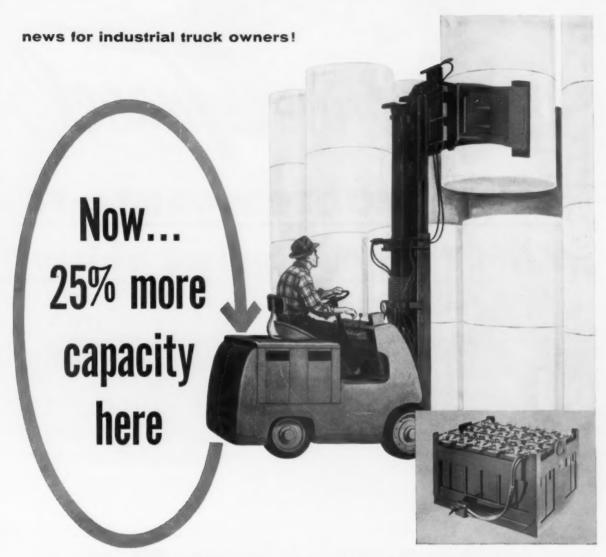
(Tubing Specialties)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



NATIONAL Seamless BOILER TUBES

UNITED STATES STEEL



with the New Edison "MC" type Battery!

Specifically designed to provide more power for modern driver-ride, sit-down fork trucks, this newest Edison battery development provides 25% more capacity than ever before available in nickel-iron-alkaline batteries . . . to suit the limited battery compartments of such industrial trucks. Extra power too, for operating various hydraulic devices which speed handling in plants and warehouses.

Besides this unusual space-capacity ratio, the new "MC" offers

all of the profitable features that are typical of Edison Nickel-Iron-Alkaline Storage Batteries: steel plates and cell containers for the most rugged, long-life service electrical characteristics that assure foolproof operation and outstanding depend-

And like all Edison batteries, the new "MC" is designed and built to give more than twice the performance life of other type batteries. Be sure to investigate this new Edison de-

velopment today!

Most dependable power... lowest over-all cost you get both with an EDISON



STORAGE BATTERIES

EDISON ALSO MAKES THE FAMOUS "V.P." VOICEWRITER AND THE TELEVOICE SYSTEM

If you operate battery electric industrial trucks, or are planning to purchase one soon, be sure to have the complete facts on the new Edison "MC" type battery. Clip the coupon below and mail it today.

Edis	on Storage Battery Division
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511	Lakeside Avenue
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ľm i	nterested in the new MC battery—
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For Inxurious Travel

on the MODERN SANTA FE...



The full length Dome Car with 6-Wheel Outside Swing Hanger Type Trucks.

Built by Budd

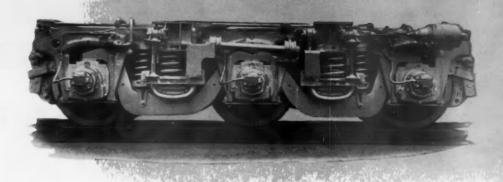


with 4-Wheel Outside Swing Hanger Type Trucks.





GENERAL

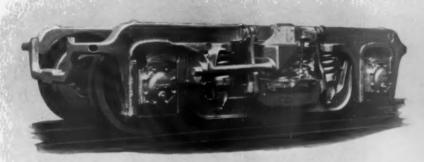


Commonwealth

Commonwealth 6-Wheel Outside Swing Hanger Truck with Central Bearing.

Outside Swing Hanger Type Trucks

and Central Bearings



Commonwealth 4-Wheel Outside Swing Hanger Truck with Central Bearing.

Dome cars, chair cars and baggage cars, built by The Budd Company for service in the Santa Fe Railway's new San Francisco Chief, El Capitan, Chicagoan, and Kansas Cityan, feature newest Commonwealth Trucks with Outside Swing Hanger Suspension and Central Bearings. Of the most modern design, the dome cars and chair cars provide every passenger convenience, smooth, quiet riding and true travel luxury.

COMMONWEALTH Trucks with Outside Swing

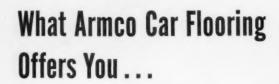
Hanger and Spring Suspension assure better riding at all speeds with reduced car body roll. Swing hangers and bolster springs are on the outside of the truck, readily accessible for inspection. The Central Bearing eliminates truck shimmy, increases wheel mileage and requires no lubrication.

These latest design trucks assure improved travel comfort and substantially reduced upkeep costs. Order them to improve the riding of *your* present cars and specify them for new equipment.

STEEL CASTINGS

GRANITE CITY, ILL.

EDDYSTONE, PA.



A composite steel and wood floor designed for today's lading requirements. Ideal for gondola, box or flat cars—in new construction or in the replacement of worn-out wood or steel plate floors in existing cars.

Steel hat-section ribs are made to resist concentrated loads and impacts that would break through wood flooring.

Alternately spaced wood nailing strips permit nailing of skids in the proper way—to a stout wood plank.

A floor that handles bulk—or unit-lading equally

well, saves time and money in switching empty cars.

In addition, it offers operating economy through longer floor life, better protection for lading and less time out for repairs. Five years of service have proved the design of Armco Freight Car Flooring and instal-

For more information on this multi-purpose car floor, write us for the new booklet, "Armco Freight Car Flooring" at the address below.

ARMCO STEEL CORPORATION

lation practice to be sound.

2984 Curtis Street, Middletown, Ohio Export: The Armco International Corporation





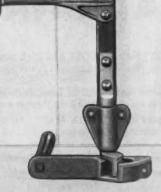
MINER

3-WAY DOOR OPERATOR
For
Refrigerator Cars



- Open single door for inspection of perishable commodifies
- 2. Open first and second doors for usual refrigerator car servicing
- Open all three doors to provide opening up to 7 feet in width to accommodate mechanical loading equipment.

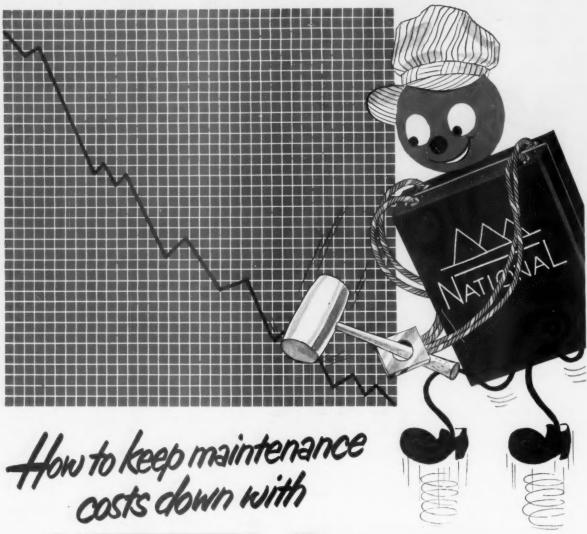




All doors are substantially supported. No tracks or floating fixtures to be serviced. All insulation tightly sealed by door keepers and hinges. Inside faces of all doors may be cleaned from loading platform with doors in opened position.

W. H. MINER, INC.

CHICAGO



NATIONAL BRUSHES

TRADE - MARK

LOW MAINTENANCE COST and high pay-load return start with "National" brushes . . . the finest money can buy.

These brushes work hand in hand with preventive maintenance to cut costs...and keep them at a minimum.

Here's how: A PROPERLY MAINTAINED COM-MUTATOR surface is easy on the brushes and gives the best commutation while the superior electrical properties and film-forming characteristics of "National" brushes, in their turn, *help* maintain the kind of commutator surface that's best for them ... and best for you.

STAY MILES AHEAD with "National" brushes and keep maintenance on the low-cost preventive side!

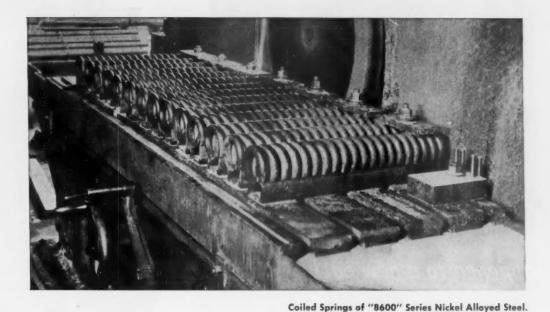
How good is really good brush performance?...
use "National" brushes and see!

The term" National", the Three Pyramids device, and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY A Division of Union Carbide and Carbon Corporation 30 East 42md Street, New York 17, N. Y.

District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco IN CANADA: Union Carbide Canada Limited, Toronto





Type "8600" Nickel Alloy Steel Extends Life of Heavy-Duty Railroad Springs

For longer life in coil and leaf springs for locomotives and cars investigate the "8600" series (ASTM-A332) nickel alloy steel.

Consider the remarkable advantages this steel offers you for all types of heavy-duty coil spring applications:

SUPERIOR SURFACE QUALITIES EXCELLENT ELASTIC STRENGTH GOOD IMPACT RESISTANCE LESS DECARBURIZATION EXTENDED FATIGUE LIFE

In Diesel locomotives both the coil and leaf springs of the "8600" type have given long trouble-free life. These nickel alloy steel springs are also used to provide the desired smooth riding characteristics required in modern passenger car coil springs as well as long travel inner springs under freight cars.

Nickel alloyed steels and irons are giving excellent results in all sorts of railroad applications. Upon request we shall gladly furnish you with counsel and data regarding appropriate nickel alloys for your requirements.

A revised edition of "NICKEL ALLOYS IN RAILROAD EQUIPMENT" is now available. Write for your copy today.

Increasing use of this nickel - chromium - molybdenum

Dept. 20, 67 Wal	nal Nickel Company, Inc.
*	MIGNO ALL
New York 5, N.	Y.
Please send me	booklet en-
titled "NICKEL	ALLOYS IN
RAILROAD EQ	UIPMENT."
	The second secon
Name	
Title	
Name Title Company Address	



THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

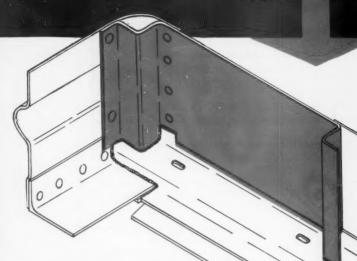
This happened to a new car!

it

couldn't

happen

here



INTERNATIONAL'S CORREC-TIVE DESIGN: An integral 3/16" W-section corner post, side-sheet and side post. nternational Cteel

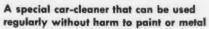
COMPANY

RAILWAY DIVISION EVANSVILLE 7, INDIANA

PENNSALT PEN-GLEAM

CLEANS

BUT DOESN'T CORRODE



Pen-Gleam is a properly buffered, carefully balanced alkaline car-cleaner that removes tenacious road film, yet is mild on hands, harmless to paint and metal. It is economical to use, works in any water, can be applied manually or by an automatic car-washer

Large proportions of wetting agents and water softeners enable it to cut grease and grime fast. Yet Pen-Gleam will not attack paint at use concentrations. Under the name "Cleaner 85" it has long been used by roads to clean diesel locomotive exteriors.

Pen-Gleam will do an excellent job of maintaining a car's "like-new" appearance if used regularly, Pennsalt recommends an occasional acid wash to remove accumulated oxide film.

Here then is a modern cleaner that keeps cars bright and fresh, but *doesn't* cause corrosion. The money it can save in repair costs may more than pay your cleaning costs! A Pennsalt Railroad Service Man will gladly tell you more, and arrange a demonstration if you wish. Write: Railroad Maintenance, Pennsylvania Salt Manufacturing Company, EAST: 515 Widener Bldg., Philadelphia 7, Pa. WEST: Woolsey Bldg., 2168 Shattuck Ave., Berkeley 4, Calif.

Other Pennsalt Products For RR Maintenance

- Pen-Glo—acid-type inhibited car-washing compound
- Pennsalt Cleaner 23—low-cost paint-stripper and soak cleaner

Pen-Gleam and Pen-Glo are Pennsalt trademarks.



CONTROLLED-POWER CLEANING FOR CORROSION CONTROL

How AlRengineering can

REDUCE YOUR FASTENING COSTS



Whether your operation calls for tightening or loosening nuts on tiny fraction-of-an-inch bolts or larger bolts up to four inches thread size, there's an I-R Impactool to do the job faster and easier—and cut your fastening costs.

Call in an Ingersoll-Rand AIRengineer. He'll recommend the right I-R Impactools for your fastening operations. I-R Impactools—actually pay for themselves in days.

Ingersoll-Rand

AlRengineering . . .

the modern way to faster production



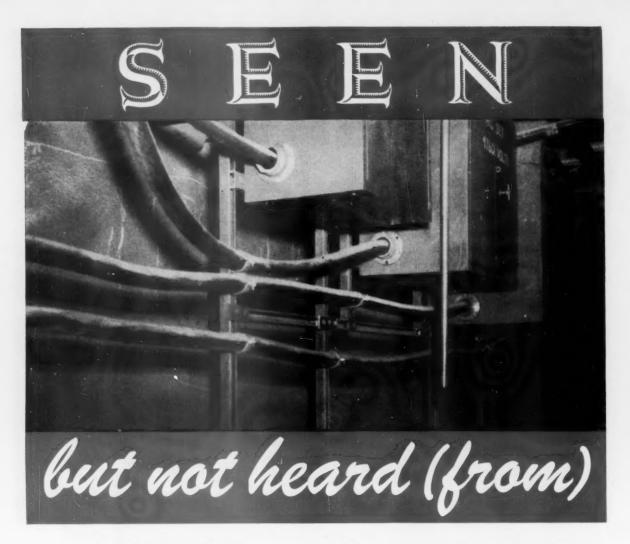
Many of the shocks occasioned when freight travels over a rough section of roadbed are never transmitted to delicate and valuable products being shipped in the cars. Why? Because the dependable shock-absorbing qualities of long travel "Railway" springs cushion the load, protecting the carrier's responsibility—and maintaining the shipper's good will!

For longer life for your rolling stock and reduced roadbed maintenance costs, equip your cars with "Railway" long travel springs. Your Alco sales representative will be glad to give you full information about them.

LWAY STEEL-SPRING DIVISION AMERICAN LOCOMOTIVE COMPANY

NEW YORK . CLEVELAND . CHICAGO RICHMOND . ST. LOUIS . ST. PAUL





A lot depends upon a trustworthy high voltage distribution system. Should this cable carrying 4160 volts from substation to circuit breakers fail, the cost in terms of lost production and work hours would far exceed the price of a new cable.

However, the chances of this cable failing are almost negligible. Why? Because it's a Simplex high voltage feeder cable. It's insulated with the famous Anhydrex XX insulation.

If your high voltage cable insulation is extremely resistant to heat and aging, is not affected by ozone, and is guaranteed not to absorb more than 15 milligrams of water per square inch when soaked for 7 days at 158° F., you're paying for ordinary insulation. If it offers this guarantee *AFTER* being aged for 7 days at 250° F., you're getting the best insulation — Anhydrex XX.

Insulation with a low water-absorption and oxidation rate stands a better chance of keeping its electrical properties, thereby assuring longer service. That's what you want in high voltage feeder cable. That's what you get with Simplex-Anhydrex XX. Write for bulletin Number 1009-A.

Simplex-Anhydrex XX. Write for bulletin Number 1009-A.

SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.

THE ENGINEER'S REPORT

PRODUCT Calol Filter Coat

Air filters on diesel locomotive
UNITS engines and car bodies

Beary dust due to
CONDITIONS rail-sanding on grades

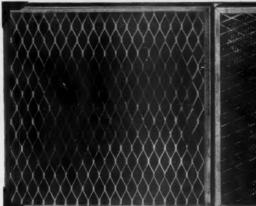
LOCATION Roseville, Calif-Sparks, Nev.

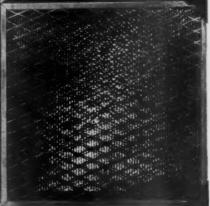
FIRM Southern Pacific Co.

New adhesive sets air filter efficiency standards!

CALOL FILTER COAT, a new type of adhesive tested on impingement-type air filters of 40 Southern Pacific diesel locomotives, allowed extension of normal filter servicing periods at least two times without appreciable loss of dust-catching efficiency. The car-body filter (immediate right) and engine air-intake filter, shown here, were photographed after 6400 miles of continuous use. Note that Calol Filter Coat is still evenly distributed, surfaces are still "wet" for maximum dustcatching efficiency and

screens are still open enough to admit light through them. All Calol Filter Coat remained in place so that the use of drip pans was unnecessary.









FREE CATALOG: "How to Save Money on Equipment Operation," a new booklet full of valuable information, will be sent you on request to Standard Oil Company of California, 225 Bush St., San Francisco, Calif.



How Calol Filter Coat Ups Efficiency of Impingement-type Air Filters



- A. Will not drip off or flow from screens
 -full amount applied remains over the
 entire service period with sustained highfiltering efficiency at all ambient
 temperatures. Easily applied by conventional methods.
- B. Has high wicking ability—quickly soaks through dirt particles in all air velocities and extreme dust concentrations.
- C. No loss from contact with rain or snow, filters are easily cleaned with usual hot-water-detergent solutions.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Barber, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

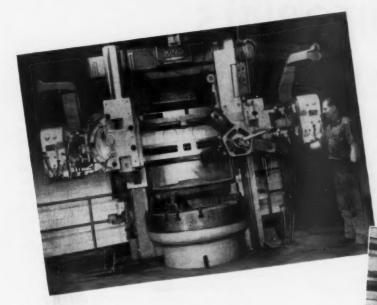
The Number One Offender

The conclusions reached as the result of an analysis of hot-box data submitted by fourteen railroads in response to a questionnaire sent out by the Mechanical Research Office of the Association of American Railroads marks a long step forward in the process of arriving at a solution of present unsatisfactory journal-box performance on freight cars. The analysis covers 74,472 questionnaires each furnishing detailed information concerning a failure on a single car caused by a hot box or hot boxes requiring wheel change. The most important conclusion is based on the fact that 71.16 per cent of the hot boxes reported are directly caused by the waste pack, mostly waste grabs, and the report states that "a practical substitute should be found that will eliminate this item as a major cause of hot boxes and its use expedited."

Enough raiiroads have undertaken to implement sound practice in servicing freight-car journal boxes at terminals and in yards to demonstrate that such practice will greatly reduce the number of hot boxes. It has always been difficult, however, to maintain such attention except on a limited campaign basis. The reasons for this are the expense to the mechanical department and delays to train departures which are hard for the operating department to take

It has long been evident that no solution satisfactory on a long-term basis can be effected by this method. The long-term solution must be one which brings the amount of attention that must be given to freight-car journal boxes to a minimum which does not require a campaign to keep it up and which reduces interference with the movement of trains to the minimum the operating department will tolerate. Whether this can be done effectively by the use of some form of packing retainer is not yet entirely clear, but certainly the field is open for the development of other means of delivering oil to the journal surface than the conventional waste pack.

CB Peck



DIESEL LOCOMOTIVE WHEELS

The KING Vertical Boring & Turning Machine at left—a modification of our standard 52" design—is used for boring, facing, and turning operations on Diesel locomotive wheels. Operations performed include trueing outside diameter, facing off hub, turning hub for dust guard, rough and finish boring, etc.

MULTIPLE BEARING CROSSHEAD

Below is a close-up view of a 42" KING in a back shop of a prominent Eastern railroad. Operator is cutting radius on a locomotive multiple bearing crosshead—one of many important maintenance jobs performed on this versatile machine.

Whatever your maintenance requirements

KING VERTICAL BORING & TURNING MACHINES

DELIVER MAXIMUM PRODUCTION AT LOWEST COST

The modern KING® line of vertical boring and turning machines meets all railroad requirements, large and small—for special purpose work such as Diesel locomotive wheel production—for general purpose work machining a wide range of railroad maintenance jobs.

From the 30" to the 144" size, each of these new KINGS is extremely versatile in its own capacity range. Each model has extra-heavy, rigid construction; smooth power; wide range of speeds and feeds; time-saving ease of control—all of which are recognized essentials for fast, precision work.

To speed your maintenance schedules and get the highest availability from your locomotives, put new KING mills to work in your shops. You'll get rapid production, coupled with dependable accuracy, on your railroad maintenance jobs. Investigate these performance proved "top profit" machine tools for your modernized maintenance program.

KING MACHINES ARE MADE IN 10 SIZES—30", 36", 42", 52", 62", 72", 84", 100", 120", 144".

Wide Variety of Head Combinations.

American Steel Foundries

KING MACHINE TOOL DIVISION

1150 TENNESSEE AVENUE - CINCINNATI 29, OHIO

EDITORIALS

Shipping Dangerous Commodities

The matter of safety transporting explosives and other dangerous materials by rail is one of great importance which has engaged the attention of railway managements and supervisors for years with generally satisfactory results in reducing losses. A review of the record for the last ten years shows a maximum property loss of about \$11/4 million in 1943 when 1,148 individual cases included 94 fires, 13 explosions, 6 persons killed and 64 injured. By 1950, these figures had been reduced to \$318,000 loss, 428 cases, 60 fires, 6 explosions, no persons killed and only 6 injured. While there has been some increase in losses since 1950, the number of explosions was reduced to one in 1952, for example, and fatilities to zero, this notable improvement being due in no small measure to educational efforts of the AAR Bureau of Explosives working with individual railroads, railroad men and shippers of dangerous commodities.

In addressing a group of car men recently, E. J. League, Chicago representative of the bureau, called attention to the fact that this is the thirty-second year without any deaths from rail movement of commercial explosives, but it is apparently a different story with military explosives, thousands of cars of which have been handled in recent years. Regardless of the utmost care in loading, when these cars are accidentally derailed and especially when fire is involved, things are bound to happen. In these cases, it is well to note that derailment causes the explosions, not vice versa.

Looking broadly at the whole problem of safe handling of dangerous rail shipments, it is interesting to note that in 1952, the latest year for which detail figures are available, acids and corrosive liquids, flammable solids and oxidizing materials were involved in 379 out of a total of 494 instances of loss. There were 54 losses due to explosives, 44 due to compressed gases and 17 due to poisonous liquids and solids. By far the greatest part of the financial loss was caused in 33 cases of derailment or collision. The other causes, arranged in order of frequency, were: improper loading or defective containers, 251 cases; employee negligence, 100 cases; rough handling, 53 cases; improper packing, 23 cases; spontaneous heating, 15; miscellaneous, 19.

One point strongly emphasized in the address mentioned was the need for greater care in certifying cars for explosive loading and making out three certificates, two to go inside each car for protection against the weather and one to the originating agent. This inspection is subject to check by ICC men, and the car men who inspect the finished load of explosive sign the No. 2 certificates. Thorough familiarity with loading rules and ordinance drawings is an obvious necessity.

Another pertinent comment in the discussion, which will strike a responsive chord with practical railway car men and car supply officers is the use of common sense and reason in interpreting all loading rules. Many cars are rejected on technicalities by local plant inspectors who may, in some cases, simply like to show their authority and in others fear criticism if they let something go which another inspector won't. Some knowledge of individual loading is essential and will help greatly in solving the problem of car supply. Why reject a car, for example, for nails high in the side walls, if the load is only two or three feet high? Similarly, what harm can any nails anywhere do to bombs loaded on two 4-in. by 4-in. wood rails extending longitudinally down the middle of the car? Heavy shells have broken through car floors and fallen to the right of way in times past, but why fuss and worry about reinforced floors when heavy shells or bombs are carried on substantial timbers which extent the length of the car, whether it be box, gondola or flat, and distribute the load more or less uniformily over the entire floor?

There are no greater sticklers for safety than the average railway car supervisor and inspector, but they don't like to see equipment wasted and railway costs mount due to slavish adherance to technicalities which have no real bearing on safe movement of car loads to destination.

New Lubrication Problem

Whether the new tight gear cases will simplify or complicate diesel operation and maintenance may depend to a greater extent than commonly realized on how we go about setting up lubrication requirements. Shall we continue in use the standard asphaltic base greases, or will this type lubricant have to be superseded because of its low resistance to oxidation? What are the facts upon which to base our decision?

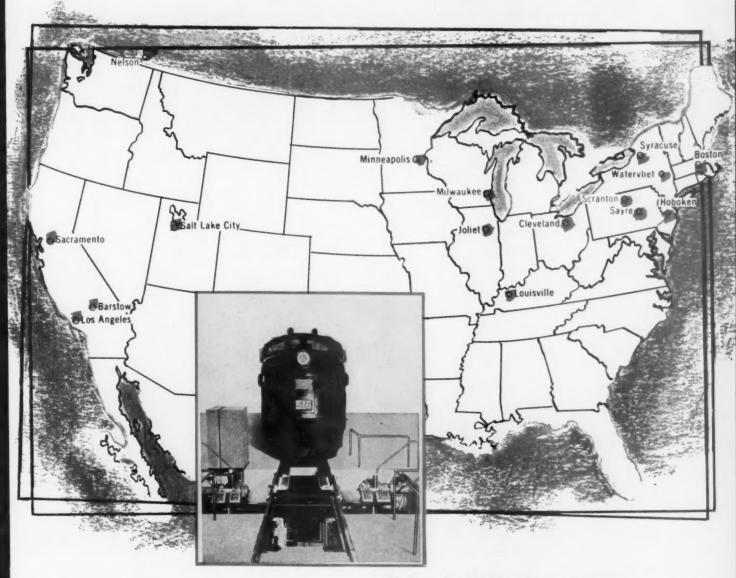
First of all, when a gear case is sufficiently tight to prevent a rate of leakage previously accepted as normal, the grease more readily becomes oxidized, changing its physical characteristics from the normal tacky, viscous material to a product that ranges from a rubbery or plastic composition to a hard petroleum coke. In the older gear cases the concentration of oxidized products that formed was kept down by the addition of fresh make-up grease at regular intervals. This safety factor will not exist with the tight case. Sufficient dilution of the oxidized material to provide satisfactory gear lubrication cannot be expected when only small amounts of make-up grease are added at infrequent intervals.

The harm that can be done extends beyond the gear case itself. When the amount of oxidized material builds up to the point where it reduces substantially the clearance between the gear and the interior of the casing the pinion and ring gear will operate as a positive displacement gear pump. This pump action will force out any make-up grease added because it will be more fluid than the old grease remaining in the case. With all gear-case

MORE and MORE RAILROADS

making MORE and MORE

Savings!



The list of railroads taking advantage of the profit possibilities in Standard's Wheel Truing Machine is growing rapidly.

Standard RAILWAY EQUIPMENT MANUFACTURING COMPANY

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Standard Railway Equipment Manufacturing Co., (Canada) Ltd. Sun Life Building, Montreal

joints or openings sealed by the hard oxidized material, the fresh grease, because of its greater fluidity, will be pumped along the armature shaft through the gear-case housing seal into the atmosphere. Occasionally it is even forced into the armature bearings and the traction motor support bearings, causing early failure. Three basic choices appear available to the diesel supervisor to prevent such difficulties:

(1) Continue to use present type and viscosity gearcase lubricant and institute rather extensive changes in procedure and inspection to make it work. The extensiveness of such changes would depend on operating conditions and probably consist principally of more frequent inspection and cleaning of gear cases to prevent

excessive formation of oxidized products.

(2) Use an asphalt grease with a lighter viscosity. The viscosity required can be determined by lubrication requirements alone and will not have to be heavier for the sole purpose of keeping leakage within tolerable limits. Lighter-viscosity greases have three advantages-more mobility, greater inherent resistance to oxidation and better adaptability to the addition of a separate oxidation inhibitor. The increased resistance to oxidation may permit inspection periods to be extended, depending on operating conditions, possibly to wheel changes or annual inspection if the gear case is throughly cleaned out and all fresh greens applied at such time.

(3) The third choice is to change from asphaltic base to one of a number of non-asphaltic-base greases available for the tight gear case. Such lubricants cost more but have a higher viscosity index which reduces throwout and permits using one grade of grease for all seasons,

they have improved resistance to oxidation.

Several well informed lubrication men and service engineers feel that some modification to gear-case lubrication practice should be made to gain full advantage from the tight gear case and to avoid unexpected problems in its use. With the evidence available, it would seem important for the railroad mechanical man to decide soon whether it will be more economical to continue to use the lower cost asphaltic-type greases, either of the present viscosity or of a lighter viscosity, and accept the changes in lubrication practice that will probably be required. or whether it will be more economical to pay a higher price for a non-asphaltic grease that will eliminate the need for these changes.

Journals Still Run Hot

A sure way of getting into a "hot" argument is to make a statement with which readers disagree, especially if it has something to do with hot journals. We did that in an editorial in the March issue in which reference was made to inspection methods for detecting copper penetration and other axle defects.

Several correspondents evidenced a healthy interest in the subject of inspection methods and questioned the reliability of existing methods. Some correspondents also feel that too much emphasis had been placed upon the

importance of the problem.

The 1953 figures on axle failures show that of axles broken due to defects, overheating and causes not stated, 65 per cent were due to overheating and they cost the railroads close to \$4 million for damage to equipment, damage to right of way and the expense of clearing wrecksnot including damage to lading.

While we may have to postpone revelation of more than one "reliable" method for detecting copper penetration we're still not ready to admit that the railroads have exhausted the possibilities of axle inspection methods. Even in these days \$4 million isn't "chicken feed."

Letters to the Editor

A Question of **Bearing Material?**

TO THE EDITOR:

In the editorial on copper penetration in the March, 1954 issue, you arrive at a proper conclusion (i.e., that if journals are properly inspected when turned down, burn-offs can be greatly reduced), but you got there by the long and wrong trail.

You say "it is estimated that 90 per cent of the car journals that are broken off while overheated are due to non-ferrous metal penetration." That statement has not been and is not likely to be proved. All that can be proved is that 90 per cent of all burn-offs show evidence of copper penetration. Since a serious hot box cannot occur without temperatures equivalent to or in excess of brazing temperatures the existence of copper is mean-

About 90 per cent of all journals operating in freight service today have been turned down for one reason or another, but probably because of a hot box at some previous time. So, it is reasonable to assume that the same percentage of journals are operating with copper penetration. If burn-offs were to show a lesser percentage something would be wrong indeed.

The iron back bearing is being promoted as a cure for burn-offs. The principal claim for this bearing (and it is not unreasonable to assume that its promoters will misguidedly seize upon your editorial to promote their interests) is that it will eliminate copper penetration and subsequent burn-offs. But the indications are that both

hot boxes and burned off journals may increase if iron-

back bearings are applied in any quantity.

M. A. Pinney, engineer of tests of the Pennsylvania, during the discussion following the March 13, 1953, meeting of the Eastern Car Foremen's Association in New York said that a burn-off occurred on his railroad on a Lackawanna car equipped with iron back bearings. Mr. Pinney said that the 51/2-in. by 10-in. journal had worn to $3\frac{1}{2}$ in. and elongated $4\frac{1}{4}$ in. before the journal burned-off, indicating that in his opinion these conditions tended to substantiate the claim that iron-back bearings would run greater distances before complete failure. However, the important thing to note is that this single instance of a burn-off with iron-back bearings establishes a burn-off incidence of failure of one per 300 cars per year, whereas the burn-off incidence of failure with bronze-back bearings is only one per 4,000 cars per year.

There is every reason to believe that the iron-back bearing will contribute to a greater hot box frequency than is the case presently with bronze-back bearings. A hot box can occur when the heat generated is in excess of the heat which can be dissipated. The thermal conductivity rate of iron-back bearings is approximately one half that for bronze-back bearings. Since a significant percentage of the heat generated must be dissipated through the bearing back, higher normal running temperatures are going to be experienced under identical conditions, and the existence of any abnormal conditions is going to contribute to a higher rate of hot boxes. There is also the fact that more heat would be generated at the journal collar when the iron back bearing rides there for any reason, and journal collar wear would be greater.

As regards cost, indications are that the initial cost of iron back bearings will be equal to or greater than that for bronze back bearings. A big saving with bronze back bearings is apparent when the scrap values for the two types of bearings are analyzed. Currently scrap bronze bearings can be returned to the bearing manufacturer at an allowance of over 20 cents per lb. The scrap allowance for iron-back bearings, whether Mechanite or ductile iron, would not be in excess of 1.5 cents per lb. Since approximately 400,000,000 lb of metal are involved, exclusive of metal in stores, these savings reach tremendous proportions.

The object of both railroads and bearing manufacturers should be one of providing a dependable bearing assembly which will reduce the incidence of hot boxes—and not one of providing a bearing which presumably will operate for a longer period of time under conditions which should not be permitted to exist in the first place. There seems little point in jeopardizing the operation of 16,000,000 journals in the hope of reducing the 500 burn-offs per year that now occur.

A READER

Detecting Copper Penetration— A Reliable Method?

TO THE EDITOR:

It is noted that your editorial on "How to Detect Copper Penetration" appearing in the March 1954 issue of Railway Locomotives and Cars states, "There are several reliable methods of inspecting car journals for copper penetration and other defects, and the unwillingness of any railroad to avail itself of these modern facilities . . ."

This laboratory makes an effort to keep abreast of technical developments in the railroad field, but apparently the author of your editorial has access to valuable information which we have not received.

At the present time, the only method which we have seen demonstrated that will disclose the presence of copper penetration on a car journal, that has run hot, is fluorescent magnetic particle inspection of the liquid type; one method of which is identified as Magnaglo.

Even this type of inspection requires a high degree of skill on the part of the operator, and optimum conditions with regard to surface condition of the axle, before the presence of copper penetration may be disclosed. In our opinion, the method could not be stated to be reliable since we have seen cases where Magnaglo inspection did not disclose the presence of copper penetration, although such penetration existed.

Engineer of Tests

Keeping Fuel Tanks Clean

TO THE EDITOR:

Referring to the item "How C&NW Keeps Tops of Fuel Tanks Clean" on page 65 of the April issue, the arrangement of the procedure is unique and no doubt accomplishes the desired result. However, I feel that we should concentrate our efforts toward the prevention of the leaks and follow the procedure of currently washing the tops of the tanks.

W. L. HUEBNER
Master Mechanic, ATSF

Insulation Resistance Measurements

TO THE EDITOR:

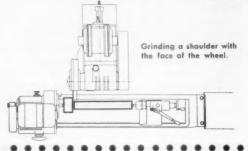
The article in the February 1954 issue of your magazine entitled, "Diesel-Electrics—How to Keep 'Em Rolling," by B. L. Judy, includes statements on page 73 concerning the use of Megger instruments which are seriously misleading.

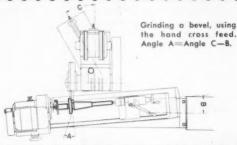
First, as a matter of record, the term "Megger" is a registered trademark and specifically identifies instruments sold by the James G. Biddle Co. Therefore, any reference to supposed disadvantages of insulation resistance measurements should not be directed at these particular instruments without being specific.

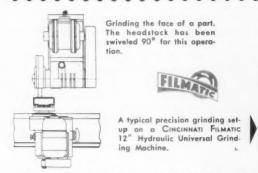
The author states that the instrument is used mostly for locating high resistance grounds because of the high voltage it develops. This is a misleading statement, to say the least. Actually, the Megger instrument is commonly and extensively used to measure insulation resistance values from zero to the maximum sensitivity of the high range instruments currently available:

(Continued on page 74)

Keeping Costs DOWNWhen Variety Goes UP







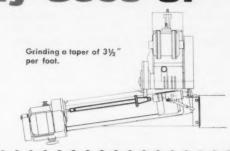
Do your precision grinding costs go up as quantities go down? The way to change this mathematical relationship is with equipment offering an exceptionally high degree of versatility. ¶CINCINNATI FILMATIC Hydraulic Universal Grinders have many features which keep costs of small quantities at a minimum, including:

FILMATIC Grinding Wheel Spindle Bearings; the most versatile in any grinding machine, self-adjusting for stock removal and quality of finish.

Hinged Internal Grinding Head; ready for internal grinding jobs at a moment's notice. Just swing it down and tighten one bolt.

Speed Ranger Headstock Drive; instantaneous fingertip selection of infinite number of speeds; AC motor.

CINCINNATI



Grinding the inside diameter of a large ring. The Internal Grinding Head, hinge mounted, is always ready to use.







Standard Headstock Spindle Nose; receives standard chucks; quick change adapter available.

Wide Angle Swivel Adjustments of wheelhead and headstock. Advantages of this construction are shown in the drawing.

Other ways in which CINCINNATI FILMATIC Hydraulic Universal Grinding Machines can reduce costs in your shop are outlined in attractive catalogs. They're yours for the asking: 12" machine, No. G-486-7; 14" and 18" machines, No. G-606-1.

CINCINNATI GRINDERS INCORPORATED

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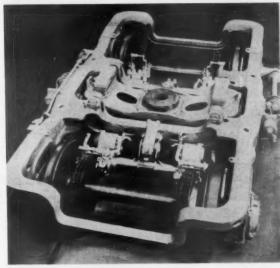
CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

Disc Brakes*—

- How They Work
- · How to Maintain Them

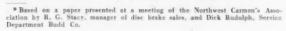
Basically any brake machine is a heat engine operating in reverse. Instead of transforming heat into mechanical energy or motion like a diesel engine, it transforms this kinetic energy into heat. Therefore, the capacity of this type machine is determined by its ability to handle the heat generated. This ability is a combined product of the thermal limitations of the friction materials used and the rate at which the heat can be stored or dissipated into the atmosphere. The magnitude of the heat dissipation problem is exemplified by the fact that stopping a train often requires 50 times the horsepower developed by the locomotive to get the train up to speed originally.

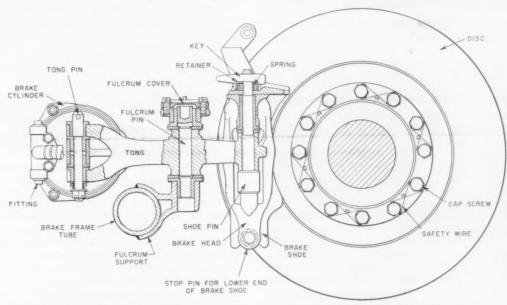
A typical disc brake installation has a brake unit at each axle comprised of two brake cylinders, four brake levers or tongs, four brake heads, four brake shoes and the brake frame that supports the mechanism in the truck. This unit is mounted in rubber to reduce vibration and



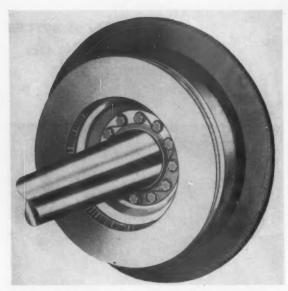
The two brake cylinders, and the four heads and shoes at each axle are supported from the truck frame.

wear. The brake frame method of support provides correct relationship between the brake shoes and the disc during the flexing of the truck and the lateral motion of the axle without need to adjust for wheel wear or truck shimming. The series of cooling fins between the braking surfaces rotate with the wheel and blow air over the 7,000 sq in. of radiating service on each disc to dissipate the heat generated during a brake application.

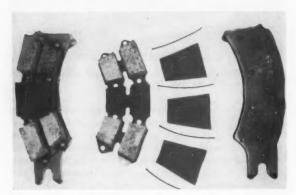




The brake heads, shoes and cylinders are retained under spring compression to reduce vibration and wear.



The disc is cast integrally with a steel stamping that attaches directly to the wheel hub.



The two basic brake shoe parts are the expendable lining and the reusable plate to which it is mounted.

The cylinder is mounted to one end of the two brake levers and the brake shoes at the other. This floating cylinder arrangement automatically compensates for any differential in brake shoe thickness. It provides for uniform pressure to each brake shoe and free lateral motion of the wheel and axle assembly during a brake application. This fixed simple tong-lever system eliminates the need for a slack adjuster. The piston travel will vary from 1 in. with new brake shoes to 4 in. with both brake shoes worn to the condemning limit. The level of braking on a car is established by the cylinder size used. For example, $7\frac{1}{2}$ -in. diameter cylinders operating at 100-lb brake cylinder pressure will produce a 3 mph per sec deceleration rate on a car weighing 140,000 lb.

One illustration shows a section side view of the brake unit showing the relative position of the component parts. This reveals the method of retaining the brake heads, shoes and cylinders under spring compression to reduce the wear caused by vibration. The cylinder-tong-brake shoe assembly is mounted to the brake frame at the center fulcrum pin. The shoe covers only a portion of the braking surface of the disc, permitting the exposed disc area to

dissipate some of the surface heat before it again passes under the brake shoe.

The cast iron material in the disc is the same used in automotive brake drums. It is cast integrally with a steel stamping that accommodates the 12 bolt holes for attaching it to the wheel hub. This steel stamping is radially flexible to permit the disc to expand and contract. The complete disc weighs approximately 225 lb. The static balance is brought to within 28 ounce-inches by machining an eccentric cut on the periphery of the center ring. The balanced disc can then be mounted on any wheel set, and there are no balance weights to come loose.

The duties of the disc are twofold. It must have the ability first to absorb and store the heat generated by a brake application and secondly, to dissipate this heat to the atmosphere as rapidly as possible. For example, in one stop from 100 mph, the disc can convert seven million foot-pounds of energy into heat in 20 seconds. Yet, it takes 6 to 8 minutes to dissipate the 9,000 Btu's generated to the atmosphere. The peak demand under rapid deceleration amounts to approximately 1,000 hp per disc.

The majority of the wheels used with the disc brake are AAR Type E-36 which has the required large inside hub diameter that can be machined to accommodate the disc mounting. Class C is recommended although some users prefer a B for reasons of standardization. The use of the higher carbon material in the class C or class B wheel is possible because the wheel has been relieved of the duties of being a brake drum.

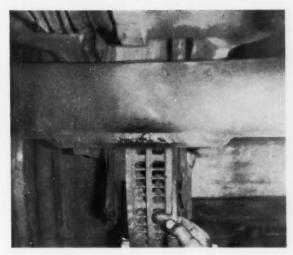
The brake shoe is comprised of two basic portions, the expendable brake lining assembly and the reusable plate to which it is mounted. In order to obtain the desired results and maintain a uniform torque characteristic, both molded and woven brake lining materials are used. These individual segments are bonded to a metal stamping which is mounted to the plate over rubber pads. This rubber is compressed and the locking wires inserted to retain it. The use of individual small lining segments rather than large solid pieces, and mounting the material over resilient rubber provides for uniform unit pressure, which plays an important part in the thermal capacity of the brake machine. All of the wear is borne by the brake shoe and actually very little wear is experienced by the disc even after years of service. The brake shoes themselves have a service life of 100,000 or more miles.

To inspect the brake equipment under the car, a simple air diaphragm type actuator is incorporated in the supply line to the brake cylinder. This AIR ON-OFF INDICATOR is mounted to the car body over the truck and tells whether the brake is set or not. Whether a brake is working can also be seen by the inspector from beyond the side of the car. A bright shiny braking surface on the disc is a definite indication that the brake has been functioning as it should.

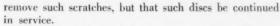
Some Practical Inspection Hints

The outside edge of brake discs becomes nicked occasionally in normal service. This is not cause for removal of the discs unless the nick is severe enough to interfere with the braking. As long as a brake lining will not be damaged and will pass smoothly over the nick when the brakes are set, the brake will operate satisfactorily.

Surface scratches are not a cause for the removal of discs as long as they do not interfere with the braking. The Budd Company does not recommend machining to



How a piece of 1/4-in. steel stock is used as a gage to check brake-lining thickness.



On occasion abnormal circumstances will contribute to thermal cracks in the disc surface. If these appear, the disc should be condemned when a crack widens to a point that it cuts the lining during a brake application. For example, a crack running to the outer edge of the disc and opening to a $\frac{1}{32}$ -in. gap is reason for condemning the disc.

The material of the disc is not suitable for satisfactory welding, and therefore repairing the disc by welding is not recommended.

The most common maintenance chore is changing brake shoes when the lining is worn to $\frac{1}{4}$ in. A piece of $\frac{1}{4}$ -in. steel stock can be used as a GO NO-GO GAGE. After applying the brakes, insert the gage between the disc and the brake lining packing plate along side of one of the brake lining segments. This brake lining thickness check is important because $\frac{1}{32}$ -in. thickness is equivalent to approximately 4,000 miles of service life.

If the brake shoe has been worn beyond the condemning limit and the disc surface has been scored it is not necessary to machine the disc in order to restore a smooth braking face. The installation of a new brake shoe and several subsequent brake applications will take care of this chore.

If the brake shoe has to be removed, the air supply is shut off to the truck as is normally done and the selflocking brake shoe key is removed with a hammer. The spring retainer and spring can then be removed from the shoe pin, and the brake shoe lifted vertically off the pin.

The installation of a new brake shoe is accomplished in reverse order of this procedure. The brake shoe must engage the stop pin at the lower end of the brake head to assure that the lower end is properly retained. When re-applying the brake shoe key, the notched surface must engage the spring retainer under it to make the self locking feature effective.

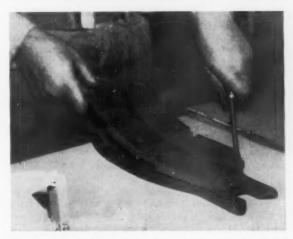
To replace worn portions of the brake shoe and lining the retaining wires are cut, the brake lining assembly removed, and rubber pads not in a good condition are replaced. Inspect the re-usable brake shoe plate for worn or loose studs. Where necessary to replace worn studs,



To remove the brake shoe the self locking key is first knocked out with a hammer.



A spring and retainer are then removed from the shoe pin, permitting renewal of the worn shoe.



The brake shoe and lining are so designed that only the worn part requires replacement.



Fixture for compressing the rubber pads when applying a new lining assembly.

use a ½-in. flat bottom drill to cut off the riveted head. The new stud should be inserted with the hole for the wire in perfect alignment with the hole in the mating stud.

To mount the new lining assembly it should be placed face down on the bench, rubber pads put in each of the recesses in the back plate, and the brake shoe and rubber pad assembled with the studs fitting into the corresponding holes in the back plate. While held together the parts are turned over and positioned on the carriage of a lining assembly fixture with the first pair of brake shoe studs lined up with the center of the pressure spindle. Placing the key over the studs and screwing down the hand wheel of the fixture compresses the rubber pads to insert a piece of wire through the holes of each pair of adjacent studs. To insure a tight assembly, it is important that this wire be 11 gage, .120-in. diameter approximately 5% in. long.

Brake heads are assembled on the brake tong using the shoe pin for support. The brake shoe is applied and the spring, spring retainer, and brake shoe key are installed to lock these assemblies to the shoe pin. In order to remove the brake heads, it is necessary that they be lifted vertically off the shoe pin in pairs because they are locked together by the engaging guide pin at the upper end of the brake head.

Before re-applying the brake heads the shoe pin and the shoe pin bushing in the brake head must be cleaned and lubricated. Budd recommends Dixon's No. 1924 graphite paste diluted to a viscosity approximating heavy paint by adding a solution of carbon tetrachloride and naphtha; if this is not available you can use lacquer thinner. For best results, this should be brushed on the bearing surfaces and allowed to dry before they are reassembled. This lubricant adheres to the metal surfaces like a coat of paint. Because it is dry and does not have a petroleum base, it prevents the abrasive materials from adhering to it and forming a grinding compound. This lubricant should be applied to all metal-to-metal surfaces except the internal surfaces of the brake cylinder.



Arrangement for dismantling the brake-cylinder assembly in an air brake shop.

When re-applying the brake heads in pairs, care should be taken to apply the proper brake head at the inside location. The brake head with the guide pin attached is applied to the inside face of the disc away from the wheel and the offset in the upper portion of the brake head is back away from the axle.

The brake cylinder is removed from underneath the car by first breaking the air connection at the cylinder by removing the two cap screws, taking care that you do not loose the ring gasket under this flange fitting. Remove the nut, washer, spring and spring cover from the bottom end of each of the two tong pins. It is necessary to insert a drift or punch in the hole on the top of the tong to hold this pin while removing the nut. Then drive both tong pins up and remove the brake cylinder by spreading the tongs.

Install the clean brake cylinder assembly after lubricating the pins and bushings by placing the cylinder between the tongs with the air fitting toward the center of the truck; applying a guide point to the end of each of the tong pins to convert these pins in to a drift and facilitate lining up the holes during this assembly; and re-applying the spring cover, spring, washer, nut and cotter pin, and the air fitting.

The conventional packing cup and lubricating swab used with the piston assembly slides within a replacable bronze bushing in the air cylinder cover. This non-pressure head holds the oil saturated felt ring which lubricates the rod.

The cylinder cover is attached to the cylinder with three bolts and retains the return spring which has a force of 180 lb in place. A cork gasket forms a seal between the head and the cylinder and the bellows type rubber boot is held in place by two stainless steel clamps, one on the cylinder head and the other on the hollow rod of the piston.

(Continued on page 64)



Where the Gas Turbine Locomotive Is Heading

How it compares with steam and diesel power and its relationship to the changing fuel picture.

DURING the nation-wide transfer from the coal- and heavy-fuel-oil-burning steam locomotives to the diesel locomotives, there has been a corresponding change in fuel types and quantities. Coal consumption, in 1953, was but a sixth of that in 1943, while heavy fuel oil was less than a fourth. In contrast, diesel oil consumption increased 20 times to nearly three billion gallons in 1953, and will reach the four billion gallon mark as the dieselization program nears completion. At the same time, diesel fuel and coal prices have nearly doubled, whereas heavy fuel-oil prices increased somewhat less than 60 per cent.

This change in the over-all trend of consumption and production of the different types of fuels is strongly affected by the magnitude of the aggregate horsepower installed in locomotives in the U. S., and it bears directly on any appraisal of the economics of future applications of gas turbine motive power.

The total horsepower installed in government-agency hydro-electric projects is less than a fifth of the total locomotive horsepower on Class I railroads (13 millions vs. 72 million horsepower). This comparison gives some idea of the impact of railroad requirements on fuel production, demand and prices. It also serves to emphasize the importance of fuel prices to the railroad industry, and the effect of these prices on the selection between differ-

ent of types of motive power. With this background data, F. Fahland, general mechanical engineer of the UP, opened his paper on the use of gas turbine locomotives before the American Power Conference at Chicago on March 26.

The present three million Union Pacific steam locomotive horsepower alone equals that of the Grand Coulee power project, the largest of its kind. The diesel percentage of total UP horsepower is lower than the over-all Class I diesel percentage, and the diesel percentage of total freight and passenger work on the Union Pacific,

GAS-TURBINE PERFORMANCE

Locomotive	Date locomotive	Total accumulated	Total accumulated
road no.	placed in service	miles	turbine hrs.
51	1-31-52	201,961	8,835
52	4- 9-52	187.987	8.084
53		175,095	7,397
54	6- 4-52	171,033	7.385
55	7- 9-52	167.839	7,165
	8-13-52	142,998	6.039
*57	5-20-53	70.540	2.981
58	7- 3-53	41,529	1.819
	8-12-53	42,638	1.899
	8-26-53	38,918	1,705
Total			53,309

*Locomotive 57 on propane fuel May 31, 1953, to January 4, 1954, 69,600 miles, 2961 hours. Converted to Bunker C fuel January 1954.

Locomotives made an average of 8,536 miles in December and operated an average of 360 turbine hours.

Fuel for the Gas Turbine

The General Electric gas turbine test locomotive was operated on straight Bunker C fuel in which vanadium pentoxide and sodium sulphate in the fuel ash reacted with the alloy steels to produce surface and depth corrosion, respectively. To be trouble-free, therefore, the fuel should have low vanadium and sodium ash content.

By 1952, when the UP locomotives were put in service, GE, in cooperation with the oil industry, especially the Richfield Oil Corporation, had evolved a specification establishing controls as follows:

- 1. The ratio of sodium to vanadium in the ash was not to exceed 0.3.
- 2. The ratio of calcium to vanadium in the ash was to be not less than 5.0.
- Magnesium, barium and nickel in the ash were a benefit and could be substituted for calcium at two atoms per one atom of calcium.
- The total ash in the compounded residual fuel oil should not exceed 0.2 per cent.

It was realized that this fuel would form deposits on the first stage nozzle and first stage rotor buckets, but this was considered less harmful than the corrosion. In 1953 it was learned that magnesium gave promise of being more effective than calcium in limiting corrosion and deposits at the operating temperatures existing in these turbines.

GE issued a new specification which stated that the ratio of the weight of magnesium to the weight of vanadium in the ash should not be less than 3.0. When the vanadium content is 2 ppm (parts per million) or less, the weight ratio need not be maintained. Also, the sodium content should not exceed 10 ppm with 5 ppm or less being preferred. The natural calcium content should not exceed 10 ppm and a value of 5 or less is preferred. The total ash in the oil should not exceed 2,000 ppm and the sulphur content should not exceed $3\frac{1}{2}$ per cent.

The new magnesium inhibited fuel has not been in use long enough to judge its effectiveness, but it is felt that it will reduce both corrosion and deposits.

This large scale fuel development program is expected to improve gas-turbine operation and permit more universal adoption.

40 and 65 per cent, respectively, is also lower than the 74 and 78 total Class I percentages. The ten gas-turbine-electric locomotives total 45,000 horsepower in comparison with over one million UP diesel horsepower, or about 4 per cent.

In 1953 the freight work performed on the UP was about 57 per cent steam, 40 per cent diesel and 3 per cent gas turbine. Projecting the possible trends during the change from steam to diesel and gas turbine for two more years shows that the turbine percentage may rise from the present 3 per cent to about 8.5 per cent in 1955.

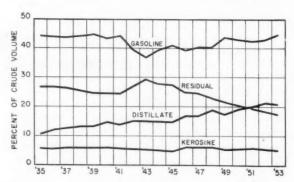
Future Gas Turbine Fuel Supplies

For the gas turbine to realize economic advantage from its ability to burn residual fuel oil with its lower cost and higher Btu value per gallon, it is necessary to be assured of a continuing supply at low cost. Two of the graphs illustrate the trends in refinery yields which give the clues to the future.

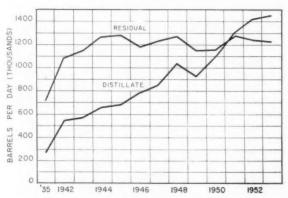
The residual percentage of the crude barrel yield has been steadily decreasing (from 27 to 18 per cent between 1935 and 1953) due partly to improved refinery practices and partly to the demand for more distillate and gasoline. Yet a relatively constant quantity of the heavy residual fuel is produced. On the Union Pacific, the use of heavy fuel is encouraged by the nearness of the West Coast refineries and by the high percentage of residual in their crude barrel yield (running up to 37 per cent, or roughly twice the U. S. average).

The comparative cost of locomotive fuel is not alone decisive in evaluating a locomotive, for the performance per train hour is an important factor. It is expected that the demand in the freight locomotives of tomorrow will be for more tractive horsepower per ton of locomotive weight on drivers, which may be paraphrased as a demand for more power in a smaller package. The appear-

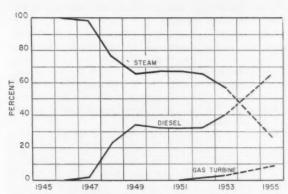
ance of the gas-turbine locomotive about four years ago was a step in this direction to pull more tons at a



Trends in refinery yields in the United States. The proportion of distillate is increasing; of residual, decreasing.



Volume of distillate and residual fuel-oil production in the United



Proportion of the freight-train service performed by steam, diese and gas-turbine locomotives on the UP.

greater speed without a corresponding increase in investment and maintenance.

Union Pacific locomotive performance differs markedly from that of Class I roads as a whole. The average Class I steam freight-train speed has remained relatively constant at approximately 15 to 16 mph for the past 10 years, the average diesel freight speed has been about 19 to 21 mph. On the UP, steam has been moving the freight faster than diesel power because the diesel will handle greater tonnages at slow speeds on the grades, and UP diesels have been assigned primarily to mountain territory. During the last year or two the diesel assignment has been broadened to cover other territories and in 1953 the UP steam and diesel average train speeds were about equal at 24 mph.

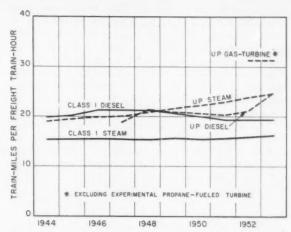
The gas-turbine locomotives moved the freight at a higher average speed and turned in more gross-ton-miles per hour than either steam or diesel locomotives. This performance met expectations that the turbine would fit in well with UP needs for moving freight expeditiously.

The gas-turbine power plant with its absence of a large number of reciprocating parts offers possibilities of reduced maintenance and overall cost of operation in a locomotive. The enormous power developed in a small space permits the construction of a single relatively short locomotive with high tractive force.

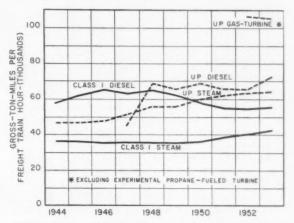
The 10 gas-turbine locomotives operate between Green River, Wyo., and Ogden, Utah, a distance of 176 miles, having a maximum grade eastbound of 1.14 per cent, where a helper is used, and a maximum grade westbound of .82 per cent. Westbound, the locomotives regularly handle trains of 5,000 tons satisfactorily.

Under favorable temperature conditions, the locomotives develop in excess of 5,000 hp for traction and, with this extra power available for acceleration, are capable of outperforming comparable 4,500-hp. diesels at speeds from 20 to 50 mph. Since the gas-turbine-electric locomotive has fewer traction motors and less weight on the rail than a three-unit diesel, it will not handle as heavy a train at lower speeds.

The accumulation of over 200,000 miles by UP locomotive No. 51 in 23 months is considered good performance, and the mileage for each locomotive for the time it has been in service is comparable to what could be expected of diesel locomotives in the same territory. The gas turbine availability is about 80 per cent and the utilization high.



Train-miles per freight train-hour—UP compared with Class I railroads.



Gross ton-miles per freight train-hour-UP compared with Class I railroads.

What the Propane Tests Showed

To eliminate the fuel variable in the evaluation of the gas turbine, locomotive No. 57 as received from the manufacturer was placed in service using propane as fuel. It operated between Los Angeles and Las Vagas (330 miles), accumulating 69,600 miles in seven months.

Propane was carried under pressure in a 12,500-gallon tank car equipped as a tender. The liquid propane in the tank car was vaporized with steam heat and supplied to the locomotive as a dry gas at about 150 lb. pressure.

The accessories required to furnish propane to the turbine are relatively simple and the fuel pump and fuel filters are eliminated. Combustion chamber inspection periods were extended to about seven times the requirements with residual fuel. It was interesting to find from this test that once the fuel is correctly placed in the combustion chambers of the gas turbine, the combustion appears complete. In other words, a gas turbine with an ideal fuel, such as propane, will have approximately the same thermal efficiency as a gas turbine burning residual fuel assuming that both are in the same condition.

Various locomotive parts have been improved from knowledge gained through the experience to date. The fuel filter panel applied to the first ten locomotives has a pair of filter pots. When the filter gets dirty, the pressure drop across the filter increases. When this pressure drop across the dirty filter reaches a pre-determined level, it starts a time sequence which transfers fuel flow through the clean filter, drains the dirty filter and then cleans the empty filter by exposing it to the scouring action of high pressure steam. Due to limited space on the locomotives, experiments are now underway to filter the oil at way-side stations.

Another part of the gas-turbine-electric locomotive undergoing improvement is the fuel metering pump which maintains equal fuel flow to each of the six combustion chambers. This pump contains 18 small high-speed pistons actuated by a wobble plate and a single eccentric port plate. These pumps have given some trouble due to temperature shock in switching from cold diesel fuel to hot residual fuel and, because of close clearances, have shown a loss of pumping efficiency due to wear. Some improvement has been accomplished in pump performance by reducing the temperature shock in changing from cold diesel fuel to hot residual oil and further improvement is expected.

Fuel atomizing nozzles require frequent inspection and cleaning. They were at first subject to leaks through the various sealing O-rings. These leaks have been overcome by design change and overall nozzle life lengthened.

The life of combustion-chamber liners was dependent to some extent upon the fuel spray pattern and, as the fuel nozzles have been improved, the liner life has been extended. Various methods of admitting cooling air to the combustion chamber have been tried and liner life is being increased with a corresponding increased length of time between inspection periods.

Many other minor changes which could only be developed in actual locomotive operation have been made in the gas-turbine-electric locomotives, resulting in improved operation and reduced maintenance.

It is no small project to develop a new type engine such as the gas turbine and use it successfully in a locomotive. Like every other machine built by man, the gas turbine has shortcomings which may be corrected with time and experience.

In general, all of the gas-turbine-electric locomotives have performed satisfactorily. Both General Electric and Union Pacific are engaged in a development program, and as the steam and diesel engines have been improved through the years, likewise we expect improvement in the gas turbine locomotives.

Disc Brakes

(Continued from page 60)

The breathing feature is a matter of displacing the air from the non pressure side of the piston into the boot. The air is forced through a large air filter in the body of the hollow rod, where bushings are pressed in each end of the cylinder for mounting the cylinder to the brake tongs. A stainless steel spring guide at the non pressure head prevents this spring from wearing into the bushing boss.

The brake cylinder assembly should be dismantled in a fixture similar to that shown in one of the illustrations. After re-assembling this unit, a bench air test should be made with a fixture to limit the travel of the piston to $3\frac{3}{4}$ in. The average leakage should not exceed 2 lb per min. from 50-lb pressure.

The brake tons are removed with the brake shoe, brake head, and brake cylinder off by removing the two large nuts and lockwashers that retain the bridge assembly. These bolts are driven downward until they drop out, using a rawhide mallet. The bridge assembly is raised vertically from the fulcrum pins and the tongs lifted vertically off the fulcrum support. Installation is accomplished in reverse order.

The wheel and axle assembly must be dropped before removing the brake frame assembly, which is supported on the rear enclosure of each journal box and attached to the center transom of the truck frame. With the flexible air hose connection to the brake cylinder, and any hand brake linkage disconnected, remove the hanger box cap, which frees the brake frame for removal from the truck. Support cables that attach to each bearing arm and support the brake frame in the truck are used only during a wheel and axle change. In some installations, the safety support hook on the brake frame takes care of this and the support cables are not needed.

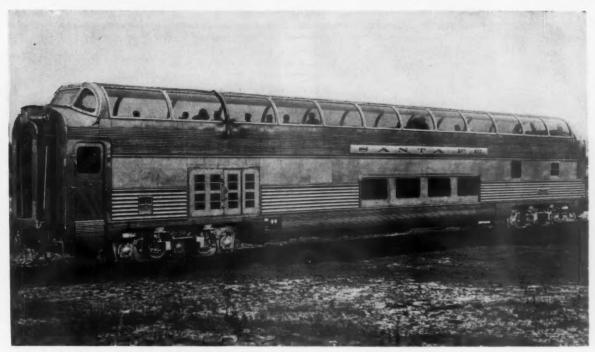
Because the disc brake produced braking efforts beyond wheel-rail adhesion limits under unfavorable rail conditions, the Rolokron was developed. This anti wheel slide device allows you to brake at a level close to the normal dry rail adhesion limits without encountering wheel damage when the adhesion level is lowered by wet or frosty rails. It detects a wheel which is going into a slide and releases the supply air to the cylinder until rolling contact is regained.

Care must be exercised all along the line in working on the Rolokron. In mounting it to the journal box there must be correct engagement of the male splines on the flexible shaft with the spline bushing which is press-fitted into the end of the axle. After entering the male splines, the Rolokron will slide into position by hand pressure and must not be forced by drawing in place with the mounting cap screws.

To make a yard inspection remove the hexagon test plug from the axle unit housing one truck at a time with the brakes set. By using the knurled surface on the rotor, turn the flywheel in one direction against the stop using your finger only. Do not use tools. The rotor should turn approximately 10 deg. in each direction. If it turns in excess of this amount remove the Rolokron and inspect the drive shaft. This procedure should release the brakes. Allow the rotor to return to normal position and observe the re-application of the brakes after a delay of approximately one second.

In order to check the protective relay circuit (which causes the slide protection to "fail safe") when making the above inspection, hold the rotor against the stop. This will close the signal circuit, energize the release relay and release the brakes. The operator should continue to hold the rotor for approximately 9 seconds and observe the re-application of the brake automatically. This indicates that the protective relay circuit is functioning as intended (this protective relay check is only necessary on one axle unit of each truck).

In the event that a Rolokron axle unit is not operating satisfactorily, remove the unit and install another one. Do not attempt to repair the axle unit in position on the wheel assembly. Repairs must be made in the shop by replacing the necessary parts.



Full-length dome-lounge car. Pipe carrying diesel exhaust follows curve of dome past windows to roof.

How Forces Are Transferrred in

Three-Level, Full-Length Dome Cars

Santa Fe buys 14 of these Budd-built cars. Eight with lower-level lounge are for coach passengers.

As Part of an order for passenger-car equipment placed with the Budd Company in 1952, the Atchison, Topeka & Santa Fe is now receiving 14 full-length dome cars, of two types, in which there are no revenue seats. Eight of these cars have a nurse's room, bar and a lounge seating 28 persons on the lower level. The other six cars have dormitory space for 12 crew members, a bar and a small lounge on the lower floor. The eight dome-lounge cars are for the use of coach passengers on the "El Capitan," the Chicago-Los Angeles all-coach train, and the "Chicagoan," and "Kansas Cityan" coach trains between Chicago and Oklahoma City.

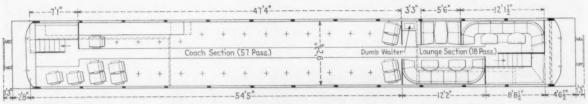
All 14 cars are 85 ft long. The loaded and the ready-torun weights of the eight dome-lounge cars are 207,070 lb and 190,970 lb, respectively, while the same weights for the dome-dormitory cars are 206,400 lb and 191,500 lb.

Structural Details

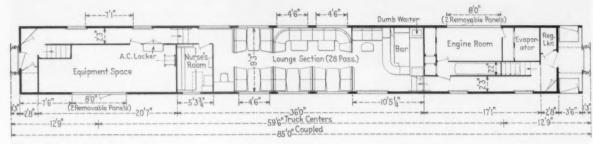
All of the cars in the order are of modified girder de-

sign, the stainless-steel structural members being joined to the stainless-steel roof, side and floor closures by the Budd Shotweld process. The end underframe unit consists of body bolster, draft-sill extensions, and the draft-gear pocket fabricated of low-alloy high-strength steel by welding, and welded to the stainless-steel structure. An alloy cast-steel end sill and coupler-carrier support to which the collision posts are welded is joined to the outer end of the underframe. Sides below the windows are stainless-steel sheets with wide corrugations. These are welded to the posts and are finished on the outside by seven narrow panels which are inserted in the corrugations of the side sheets. Flat sheets are employed between the belt rail and roof.

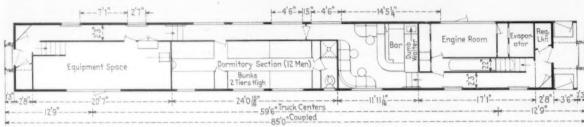
The floor structure consists of closely spaced transverse members of light-gage stainless-steel. Extended bottom flanges of the members form the subfloor. The major feature of the end structure is the collision posts. These are deep sections of stainless steel fastened at the top into the



The upper level of the dome cars.



The lower level of the dome-lounge cars.



The lower level of the dome-dormitory cars.

reinforced end roof structure at the outside purlines and welded to stubs which extend up from, and are welded to, the cast-steel end sill. The stubs reinforce the bottoms of the posts against crushing.

In the dome cars a modification of the normal structure is required to accommodate the three floor levels. The overall height of these cars is 15 ft 6 in., about 2 ft higher than single-floor cars. Over the six-wheel trucks at the ends of the car the floor is the usual 51% in. above the rail. The high floor in the upper level (at the sides under the seats) is 9 ft $10\%_{16}$ in. above the rail, and the lower level between the trucks is 27 in. above the rail.

The tail pieces of the low-alloy high-strength steel end underframe inboard of the double bolster, which forms a part of it, are extended down and attached to the end of the shallow center sill at the end of the lower floor. At this point a vertical column, approximately 20 in. square, joins the tail pieces of the end underframe and the lower level center sill to the upper-level floor structure. This distributes part of the longitudinal forces into the upper floor to which considerable column stiffness is imparted by the difference in elevation between the floor under the seats and in the center aisle. On the lower-level side of each vertical column is a transverse structural partition which takes vertical load into the car side frames.

The bolsters and the crossbearers at the ends of the lower-level floor are securely tied into the car side girders. Longitudinal center-sill loads are partially distributed to the car sides by the transverse floor members and under-

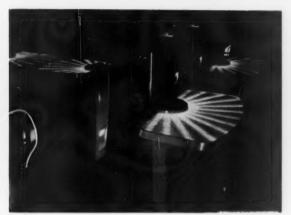
floor closure which are welded to the draft-sill extensions and tail pieces of the end underframe at each end.

Cross-members, combined with transverse vertical braces between the backs of adjoining card section seats in the lower-level lounge, serve to stiffen the shallow center-sill and to stabilize the side sill at the normal floor level. The upper-level floor, of stiffened stainless-steel sheets and plywood, is supported at the side walls and by the top flanges of Z-shaped longitudinal beams which form the sides of the center aisle. The aisle floor is supported on the lower flanges. These beams are supported by stanchions extending up from the normal floor in the equipment space and by transverse beams and stanchions at the glass partitions in the lower-level lounge.

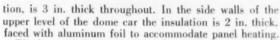
Side corridors, reached by steps from each end of the lower-level lounge, lead to the ends of the car on the normal floor level. The ceilings over these corridors extend into the dome space. They displace seats for five at one end and are concealed under one of the side lounge settees at the other. Stairs lead up to the dome from each end.

The low-ceiling space on the normal level at the ends of the car is used to house equipment usually carried underneath. At one end is the air-conditioning equipment, including two evaporators and blowers. At the other, is the power plant with electrical equipment and one evaporator. These spaces are accessible from the corridors and, through removable panels in the sides of the car, from outside as well.

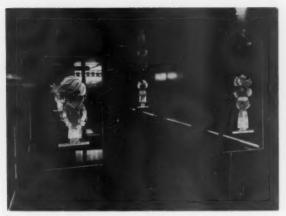
Insulation is Ultralite Fiberglas and, with one excep-



Striking effect is produced by the lights in the translucent table tops in the upper-level lounge.



Windows in the lower-level passenger space are the double-glazed breather type, arranged for glazing from the inside. Glass is ½ in. Solex non-tempered polished



Edge lighting illuminates the colorful figures in the plate-glass panels of the lower lounge in the dome cars.

plate glass on the outside and ½ in. Solex laminated nontempered glass inside. The curved dome sash are also of the breather type, glazed from the outside. Both inner and outer glass in these sash are Solex, the outer pane ¼ inthick, partially tempered, and the inner pane a sandwich of two plates of ⅙ in. non-tempered glass and a ⅙ in.

SPECIAL FEATURES OF THE DOME CAR INTERIORS

The outstanding feature of the dome cars is the upper level of the three-level car, which provides unobstructed high-angle vision through the curved roof for a total of 75 passengers. The coach section of the dome level, which occupies about 54 ft at the head end of the car, accommodates 57 persons in double and single non-reversible seats. The double seats are angled 10 deg toward the car sides. The seats are spaced $37\frac{1}{8}$ in, between centers.

At the rear end of the upper level is a lounge section about 21 ft long. Here are seats for 18 in a pair of facing seats and two seven-person built-in lounge seats facing toward the car center.

The lounge tables present an unusual appearance in daylight as well as at night. Imbedded in the translucent Lucite tops are feathery sprays of Australian seaweed. At night, when the overhead lights are turned off for passengers to observe the scenery from the coach seats forward, a light under the fixed ash tray above each table support glows through the Lucite to produce a sunray effect. This is shown in one of the illustrations.

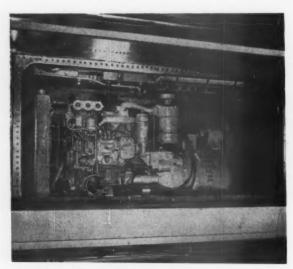
An electrically operated dumbwaiter in an alcove at one side of the aisle communicates with the bar in the lounge on the lower level. A small cupboard and counter are at the side of the alcove.

In the lower level of the car a lounge, which will accommodate 28, has a fully equipped writing desk and magazine racks built into the backs of the lounge seats. A bar is at the rear end of the lounge, An unusual feature of this room is the four transparent safety-glass panels which extend to the ceiling from the backs of adjoining card sections to divide

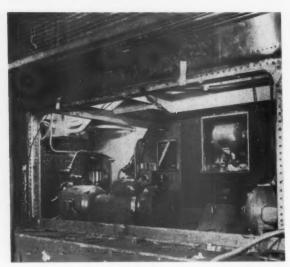
the room into three sections. Each panel consists of a plastic sheet faced on both sides with safety glass. Etched and hand painted in full colors on each plastic center is a Katchina doll authentically illustrating an idol worshipped by the Hopi or Navajo Indians before the days of the white man. These panels are edge-lit from below by fluorescent lamps placed between the backs of the adjoining sections which cause the colored figures to glow brilliantly without otherwise lighting the room.

Other decorative features include a repousse of antique copper on the forward wall of the lounge and another on the wall behind the bar. The light fixtures on the forward wall and above the bar are studded with plastic Indian sun designs.

The Mohawk carpets laid in the lower lounge and in the aisle of the upper level are a prickly pear cactus design in brown, beige and turquoise. The same pattern in lighter tones of the same colors is laid under the seats in the upper level. The coach seats in the dome are upholstered with foam rubber, furnished by Goodyear, and covered with rust super needle point. The lounge seats are covered with elastic straw-colored Naugahyde with coral piping of the same material. The seats were furnished by Heywood-Wakefield. This material, in the same and reversed colors, is used in the lower lounge. Beige, turquoise and Indian red are used in various arrangements on the walls and ceilings of both levels. The effects achieved are seen in some of the illustrations. A "starlight" effect is produced by small perforations in a hit-or-miss pattern in the metal sides of the lighting coves on both levels.



Caterpillar D315 diesel-alternator sets in the dome cars provide 220-volt, 40-kw power.



Trane air-conditioning equipment is installed at one end of a car diagonally opposite the alternator.

sheet of plastic. Outer panes on the end windshield windows are increased to $\frac{3}{8}$ in. thick. The two panes in the center windshield panel at each end of the dome are separated to form the air duct leading up to the distribution duct over the ceiling.

Ceilings and walls, in general, are lined with aluminum sheets, the unexposed sides of which are covered with sound-deadening felt. Exceptions are the pier panels in the passenger compartment of the coaches, which are Formica, and the equipment spaces of the dome cars, which are carbon-steel sheets. In the back-bar area of the lower-level lounge the carbon-steel sheets are backed with felt and, where exposed after the bar equipment is installed, covered with stainless steel.

At the front end of the upper level of the dome cars, in front of the first double seat, the wainscoting is Rigidtex metal painted to suit the interior color scheme. After painting, the high spots of the pressed pattern are polished down to the bare stainless steel. This produces a sparkling decorative effect with the color in the recesses of the pattern protected from scuff marks. Ceilings in the passenger compartment of the coaches and in the lower level of the dome cars have Multi-Vent panels under the air-distribution duct.

In the dome cars the longitudinal partitions between the corridors and equipment spaces are built of carbon-steel tubing faced with aluminum or stainless steel on the passenger side and on the equipment side with perforated carbon steel. Partitions around the nurse's room in the dome-lounge cars and the dormitory partitions in the dome-dormitory cars are plywood covered with bonderized zinc-coated steel, similar to the partitions around toilets and lockers in the coaches.

The floors in the dome cars are ½ in. water-resisting plywood, treated to resist rot. This material is applied to the transverse floor supports from which it is separated by sound-deadening material. Carpets are laid over a ¼ in. rubber carpet pad. In corridors, toilets and crew quarters the floors are covered with rubber tiling.

Electrical Equipment

Electric power for lighting, air conditioning, and battery charging on each dome car is developed by a Caterpillar D315 diesel-generator set. The diesel is a 70-hp engine and the generator a 40-kw 220-volt, three-phase alternator operating at 1,800 rpm. This plant is located in the equipment space at the B end of the car and can be rolled out of the car through an opening in the side covered with removable panels. A tank underneath the car carries 200 gal of fuel.

Ventilation is provided by Farr dynamic grills in the removable panels in the side of the car and a fan on the generator drive shaft. No air is drawn into the equipment space from inside the car.

Protection against fire, which might be caused by an overheated bearing or other failure, is effected by an automatic detection and extinguishing system of C-O-Two design. Fenwal repeatable fire and overheat detectors set to actuate at 275 deg F release into the compartment 75 lb of pressurized carbon dioxide through nozzles.

The 220-volt current produced by the power plant is used directly to operate motors on fans, blowers and the air-conditioning compressor. Three 1½-kva delta-connected air-cooled transformers in the 220-volt circuit furnish 110-volt power for lighting, refrigerators and music. The 32-volt battery is charged from the 220-volt circuit through a selenium rectifier. This operates the dieselengine starter and furnishes current for emergency lighting should the power plant fail. A relay automatically cuts in the emergency direct current lights in case of alternating current power failure.

General lighting throughout the dome cars is fluorescent and is arranged to give many different effects. In the dome area, in addition to the illuminated table tops, indirect lighting of low intensity runs the length of the dome at the sides of the ceiling, producing the starlight effect, to which reference has already been made, through perforations in the lower side of the cove enclosure. In the lower level lounge 16 different lighting effects from direct to indirect lighting are possible.

Public-address and wire-recorded music systems are installed in the dome cars. Loudspeakers are installed in the lounges and the coach section of the upper level of both types of dome cars. In each dome-lounge car a speaker is also placed in the nurse's room.

Heating and Air Conditioning

Vapor Unizone heating equipment is installed in each dome car. There are three of these systems in each car. Two control the temperature in the dome, one at each end. Each of these also controls the temperature of the passageway at one end of the normal level. The third system furnishes heat to the lower level lounge and nurse's room in the dome-lounge car and to the small lounge and dormitory in the dome-dormitory car. Heat is supplied by low pressure steam through fin-tube floor radiation and overhead heat from radiators in the air-conditioning evaporator. Panel heating is provided in the sides of the dome below the windows.

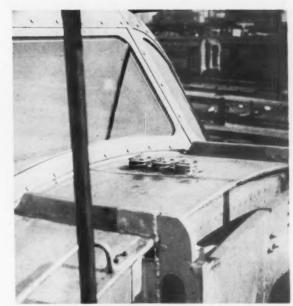
The temperature in the engine compartment is maintained thermostatically to keep the temperature above 50 deg. In the equipment space which houses the service water tanks manually controlled heat is supplied.

Maintenance of a uniform temperature in the dome is made difficult by the great difference in the sun heat load between a bright sun and an overcast sky. Adjustment for this is effected by Vapor Solar Discs. Three of these devices are mounted on the roof at the B end of the car. When subjected to heat of the sun, they function to lower the temperature setting of the thermostats in the dome by $\frac{1}{2}$ to 4 deg, depending upon the intensity of the sun. When clouds hide the sun, the temperature setting of the thermostat is raised so that less cool air is delivered to the dome space. The Solar Discs also change the thermostats that control the cooling system in the dome to adjust for sunny or cloudy summer weather. A sensitive mercury contact thermostat in one of the Solar Disc fittings causes the air-circulating fans to speed up whenever the temperature reaches and passes a limit of 85 deg.

Each dome car is provided with Trane electromechanical Freon air-conditioning units with a total capacity of 20 tons. Two Trane motor-driven compressor units are mounted in the A end equipment space with one 20-ton combination wet-and-dry type condenser. Two 8-ton cooling units, one mounted in each equipment space, supply conditioned air to the dome, one to each end. The 4-ton unit for the lower level is placed in the equipment space adjacent to the bar bulkhead.

Air from the cooling units flows up through glassenclosed ducts in the dome windshields to the ceiling distribution duct. It is discharged through two rows of slot diffusers extending longitudinally along both sides of the ceiling and through Aneomstat diffusers placed at intervals along the center of the ceiling. Exhaust air from the dome passes through openings in the floor under the seats into ducts leading to two exhaust blowers in the B end equipment space which discharge it outdoors through the floor. Exhaust from the lower level passes through grills to ducts leading to these same blowers. Fresh and recirculated air streams are mixed in plenum chambers, then pass through Farr viscous filters to the evaporator blowers. Damper controls can be set for 25 per cent, 50 per cent, and 100 per cent fresh air.

The dome cars have a service water capacity of 300 gal contained in two tanks housed in the equipment space and not insulated. The service water tanks are connected to the



Solar discs compensate for the effect of varying sun load on the need for heat in the dome.

air-conditioning condenser tank to provide make-up water when needed.

An Everclor automatic chlorinator is applied in the service-water systems. This is connected to the pneumatic water-lifting system so that, when the air pressure in the water tanks is released for filling, a measured quantity of a chlorine solution is automatically introduced into the tank.

Everpure filters are installed in the water lines from which water is drawn for the water cooler and dental basins in the coach and for drinking water, water for ice cubes, and for the washstand in the nurse's room on the dome cars. These filters remove all the taste and odor of chlorine as well as sediment and colloidal matter from the water.

Trucks and Brakes

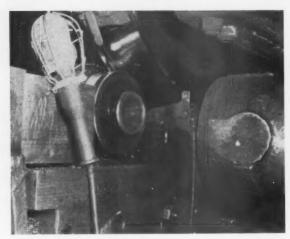
The dome cars have Commonwealth six-wheel outside swing-hanger trucks of General Steel Castings' design with all coil springs and vertical and lateral shock absorbers. The wheel base is 11 ft. Axles have Timken roller bearings for 6-in. by 11-in, journals. Central bearings are 24 in. in diameter and are fitted with Gatke 1-in. liners. The truck brakes on these cars are American Steel Foundries combination rotor and clasp type.

All trucks have rubber bolster end bumpers and are sound deadened with Fabreeka pads over equalizer spring seats, on journal-box equalizer seats and over the bolster springs. Gatke liners prevent metal-to-metal contact at the center plate.

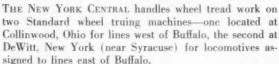
Air brakes on all cars are Westinghouse HSC with D22-AR control valve, without straight air or electric brake-pipe control. Westinghouse AP Decelostat equipment is applied on one end of each axle.

Draft gears on all cars are Miner A-4X-B. Couplers are controlled-slack Type E without lateral centering device. Operating in conjunction with the side stems, the buffer gear is the Miner friction type B-18-X.

New York Central Diesel Wheel Maintenance



Three cuts are normally taken—one to rough out the contour; one to get under the scale; the third, a finishing cut.



DeWitt was selected for the location of the wheel truing machine for lines East because it is the largest classification yard east of Buffalo. All freight locomotives are changed here with the exception of a few symbol trains each day. It is also handy for passenger locomotives, which are normally worked from Harmon to DeWitt on trains that terminate at Syracuse, but can also be relayed for wheel work on through trains. The latter practice is followed for locomotives found to be approaching the need for wheel work at Boston as no passenger trains from that point terminate at Syracuse.

The machine at DeWitt is located at the approximate center of the end pit of the dead side of the terminal maintenance shop to avoid tying up the running repair tracks. The end pit was chosen because it is the only through track on the dead side. The usual procedure is to route the locomotive to the wheel truing machine from the rear of the shop after cleaning. The locomotive is brought into the house by hostler and final movements made by a car puller located at the front end.

The machine was installed in June 1953 and has been in operation 24 hours a day 7 days a week ever since. Over two hundred pairs of wheels are re-contoured each month. About 35 per cent of the wheels are turned for routine maintenance such as high flanges, wear and shell



The locomotive wheel makes one revolution for each cut, with the starting point marked by an arrow.

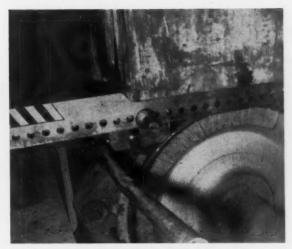
out, about 15 per cent for flat spots. In almost all cases where one set of wheels requires turning, all sets are turned—(1) to keep the diameters within the required limits of each other, and (2) in most cases when one pair of wheels needs turning the others are almost ready to require it.

Wheel Turning Time

Wheels are turned only when shown to be necessary by the gage or other defects such as shell-outs or flat spots. No maximum mileage is set for any class of power. On the average it takes about two hours for each wheel set, or one shift to complete a freight unit, 1½ shifts to complete a passenger unit with six-wheel trucks.

Three passes are normally made by the contour milling cutters on both driving and idler wheels. The first cut brings the wheel to the required rough contour, the second cut gets under the scale and the third is a finishing cut. On drivers, the depth of the first cut is 0.300 in., the second two cuts are each 0.180 in. The cuts on the idler wheels of passenger units are not quite so heavy as there is less weight on these wheels when the locomotive is in place on the machine. The three cuts on the idlers are 0.250, 0.125 and 0.080 in. deep.

The machine is run at medium, or No. 2 speed, and the locomotive wheels make one revolution in 25 minutes. Higher speeds have been found by experience to tear up the wheel metal and to chip the cutters. Both wheels on the one axle are machined to the same dimension at the same time with the tools aligned by dial gage.



How the locomotive is held in place by blocking wheels on either side of the set being milled.

Tool maintenance is virtually nil. Each of the 110 cutters on each side of the machine is given $\frac{1}{16}$ th turn after each four pair of wheels. This gives up to 128 wheel pairs for the two sets of tool on either side if the tools are not chipped (4 sets per turn, 16 turns per side and 2 cutting sides). If a tool is chipped, more than $\frac{1}{16}$ turn will have to be made on that particular one to turn beyond the chipped area, and it will correspondingly have a shorter life than the maximum of 128 wheel sets. No grinding or other maintenance is given to the tools; after being turned and used up they are discarded.

The NYC has a dolly which carries the wrenches and other small tools required for removing journal box covers and other operations. The dolly will also have space to hold the journal box covers to keep them off the floor. An air-operated grease gun on wheels will also be added with a container holding 400 lb. of grease. There is also a disposal unit to carry the chips directly outside the building for loading into a scrap car.



Most wheels are aligned for the milling operation by the axie centers and the tools positioned by dial gage.



Wheel sets which have equipment driven by a splined bushing in the axle are centered by a special fixture.

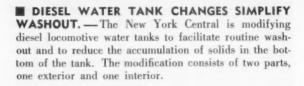


The wheel truing machine is located in the center of the dead work track to avoid tying up running repair tracks.

Ideas for the Diesel Repair Man...



The application of 18 washout plugs simplifies routine washout of





The baffle plate holes were also enlarged to 6 in. and reinforced with horseshoe-shaped plates.

For the exterior modification, 18 holes are burned out and Huron washout plugs are applied along the bottom and on the curved surface between the bottom and the sides. Inside, the holes in the baffle plates are enlarged to about 6-in. diameter and a ½-in. horseshoeshaped reinforcing plate is welded around each hole.



Cantilever rail extension for handling wheel sets and traction motors into a converted roundhouse.

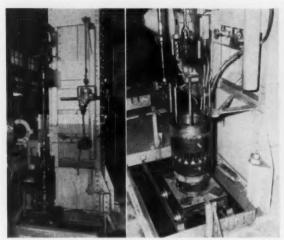
■ RAIL EXTENSION SIMPLIFIES WHEEL HAN-DLING.—The Frisco diesel shop at St. Louis employs an interesting method for delivering mounted wheel sets and traction motors into the diesel servicing shop. A jib crane has been mounted outside the wall of the shop, and a cantilever extension of the rails was built out about 3 ft. This permits delivery of the wheel sets from the storage area on rails across the turntable and into the general area served by the jib crane. The crane then lifts the wheel set up and places it on the rail extension, where it can be rolled into the shop for application to the trucks.

Traction motors are delivered into the shop in a similar manner. After being lifted by the jib crane they are placed on the dolly shown in the background of the illustration for rolling into the shop to the point where they are to be applied.

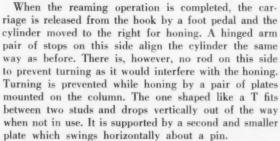
The rail extensions are of 90-lb secondhand rail with a heavy reinforcing bar 2 ft long across the track joint.

■ REAMING AND HONING AT ONE LOCATION.—The illustrations show how diesel engine cylinder liners and air compressor cylinders are reamed and honed at one location. The work piece is loaded by jib cranes on a dolly which runs on two strap iron rails.

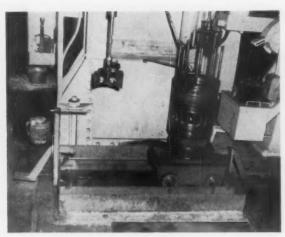
With the cylinder secured on the dolly, it is rolled to the left where it is automatically aligned for the reaming. The alignment is made by the carriage coming against a pair of stops on the rails at the left. It is held in the aligned position by the S-shaped bar with the hooked end. Turning of the liner of cylinder during the reaming operation is prevented by a rod which slips through the air intake ports.



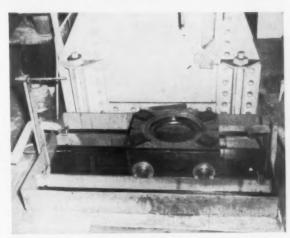
Arrangement for reaming and honing diesel cylinder liners and air compressor cylinders at one location. Turning during honing is prevented by T-shaped member between studs; during reaming by rod in background.



The reamer is driven by an air motor through a reduction gear and spline shaft. The tools used are the standard ridge reamers furnished by Electro-Motive or Alco. The ridge reamer motor and honer motor are each controlled by a separate valve. The coolant pump used is off an old machine that has been scrapped.



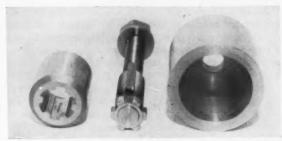
Locking in position is by stops on the rails and the S-shaped members with the hooked end on either side.



For both operations, the cylinder is mounted on this dolly which rolls between the two work positions.

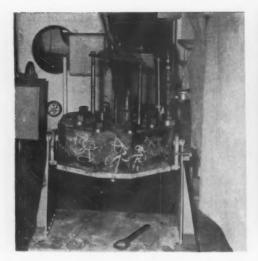
bushings from the end of a diesel locomotive or passenger car axle can be removed quickly and without damage to the bushing or the hole bored for it by using a device shown in the center of the illustration which fits (with the key removed) into the spline bushing on the left, and is pushed in as far as it will go. As the tool is inserted, the six small teeth, or lugs, on the end of the shaft ride in the six splined slots of the bushing. When all the way in, the end of the tool shaft with the lugs fits in the recess behind the end of the bushing and the end of the hole bored in the axle.

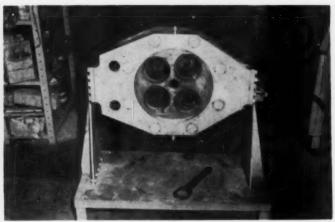
Giving the puller a sixth of a turn brings the lugs against the solid portions of the spline at the end of the bushing. Inserting the key in the top of the puller shaft holds this alinement. At this point the cup on the



right is slipped over the puller, the nut threaded on the protruding end of the shaft, and the bushing pulled into the cup with a 12-in. wrench.

All parts of the puller are made of high-tensile steel to get sufficient strength with the limited clearances.





How the head (left) is hooked up to a rubber hose to permit tilting later to inspect for cracks. The head can be revolved to different angles, as shown above during the test to simplify finding any cracks.

HYDROSTATIC TESTING ALCO HEADS. -

The illustrations show a test stand which simplifies making hydrostatic tests on Alco cylinder heads and permits revolving the head to check for cracks. The top plate which holds the head is $1\frac{1}{4}$ in. thick, the upright $\frac{3}{8}$ in. thick. The head studs and grommets are Alco standard.

The hydrostatic test is performed at 300 lb. The arrangement is pivoted and balanced so that the head can be turned to any position for complete inspection. Two air relief cocks are incorporated in the stand to dissipate the air pressure when filling the cylinder heads under test with water.

Insulation Resistance Measurements

(Continued from page 55)

namely, 200,000 megohms. The Megger instrument is just as useful in determining the presence of low resistance grounds as it is in determining high resistance conditions. Furthermore, Megger instruments are available with rated d-c output voltages of 100, 250, 400, 500, 1,000 and on up to 10,000. This means that the user can, if he wishes, choose an instrument which for practical purposes matches the operating voltage of the circuit or equipment being tested.

Actually, the Megger instrument only applies its maximum rated voltage to insulation having high resistance values, and some users prefer an instrument having a voltage rating somewhat in excess of the normal operating voltage of the equipment being tested so that a mild proof test will be applied to insulation having normal resistance values. This mild proof test may search out incipient faults such as clean fractures which are not always revealed in the insulation resistance measurement. Such incipient faults are potential dangers to the reliable operation of the equipment, and their elimination should be considered a part of any "trouble shooting" activity.

We would particularly like to take exception to the author's statements in which he says the Megger instrument has one disadvantage, in that if the insulation is already weak, it may create new grounds. As previously explained, if a Megger instrument is used with a voltage rating much in excess of the rating of the equipment being tested, and a defect such as a clean fracture exists in the insulation, then there is a good chance that the instrument will find this defect. If, on the other hand, a Megger instrument is used having a voltage rating greater than the rated voltage of the equipment being tested, any effort to search out such defects as clean fractures will probably be fruitless.

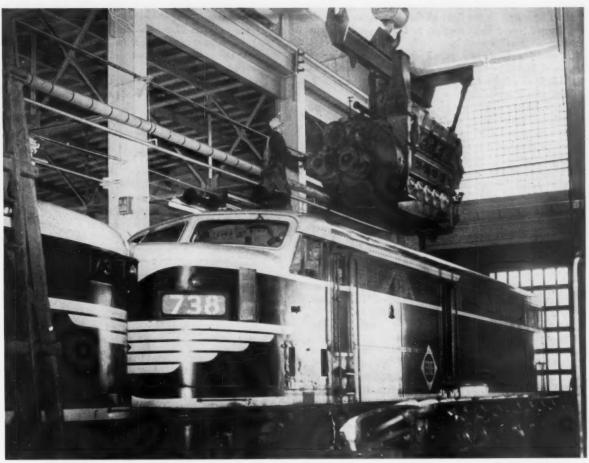
However, the internal resistance of Megger instruments is deliberately made high enough to cause a pronounced droop in their output voltage as the resistance of the insulation under test approaches zero. In other words, the output voltage of the instrument is at its rated level when the insulation resistance value is near the infinity end of the scale, and approaches zero when the insulation resistance value approaches zero. Therefore, if the author's term "weakness" means such deteriorating influences as moisture, dirt or carbonized paths, which are revealed by subnormal resistance values, then the voltage applied to the insulation will be automatically reduced as its dielectric strength decreases.

We hope that this discussion of the problem of trouble shooting insulation defects will help in clearing up some of the misunderstandings which seem to exist in making such tests.

E. B. CURDTS

Director of Engineering, James G. Biddle Company

ELECTRICAL SECTION



A modernization program can be carried out most economically when the locomotive unit is scheduled for general overhaul.

Let's Keep Them Up-to-Date

Reduced maintenance, better overall locomotive performance and a reduction of parts in stock may be realized by replacing some parts with those of improved design

New as most diesel-electric motive power is today, current models are greatly improved over those produced seven, six, or even three years ago. This progress has been the result of an intensive development program. Working closely with the railroads, the manufacturers

By N. W. Seip

have been able to market greatly improved motive power in a relatively short time.

Many design improvements are applied by the railroad to older motive power units almost unknowingly.

Mr. N. W. Seip is in the Locomotive and Car Equipment Department, General Flectric Company, Eric, Pa.

These are in the form of completely interchangeable parts and assemblies of improved design furnished by the manufacturer. However, there are some design improvements which require modification of the engine, control, rotating apparatus, cab structure or running gear before they can be applied to older design locomotives. These will be discussed in the light of the desirability of keeping motive power fleets abreast, as far as possible, with current production models.

A question frequently asked when modernization is proposed is, "Why should my company spend money to do this kind of a job? After all, this motive power is comparatively new!"

There is only one answer:—more profit in the form of reduced maintenance costs, better overall locomotive performance and minimum parts stocks.

Let us see how each of these factors contributes to economical railroad operation.

REDUCED MAINTENANCE COSTS: Improved design usually means longer life or lower cost—or both—for the assembly or part. This reduces maintenance labor costs. A further gain is realized through having a minimum number of types of equipment to maintain. Maintenance personnel training is made easier. These factors combine to produce higher locomotive availability.

Better Performance: A modernized locomotive is often able to do more work because of its higher horsepower and tractive force ratings.

MINIMUM PARTS STOCKS: Modernized locomotives provide optimim interchangeability of parts. As a result, inventories are reduced to the lowest point, and the stores department's job is made easier.

Parts and assemblies of current design are readily obtainable. Also important is the fact that their prices reflect the high production rate of current designs.

We buy something only when we expect to benefit to an extent which overshadows the initial cost. This applies to design improvement. The manufacturer considers it when designing a new model. The railroad considers it when applying such an improvement as a modernization of existing equipment. Under such conditions marginal ideas seldom, if ever, reach the production stage. New features must pay off in terms of customer benefit or they just aren't used.

What to Modernize

There are three principal areas of modernization opportunity:—the electrical system, the diesel engine, and the cab and running gear.

1. ELECTRICAL SYSTEM. In considering this let us look first at the rotating apparatus. Earlier design traction motors may be modernized to higher rated models. This changeover includes such up-to-date features as sealed bearings, felt wick lubricators and neoprene-jacketed cable leads. Older model traction generators, auxiliary generators, exciters or blower motors may be changed to designs with higher current ratings. This offers reduced maintenance and optimum parts interchangeability.

Control equipment on current model locomotives is easier to maintain, gives better performance and has increased reliability. Such desirable features as automatic current limit in dynamic braking, a simplified field shunting system and the latest control circuits can now be applied to early design locomotives.

2. DIESEL ENGINE. Governors of early design can be modernized to include latest features. Fuel pump, crankcase exhauster and fan drive motors can have sealed lubrication applied to bearings. All this means easier and more economical maintenance.

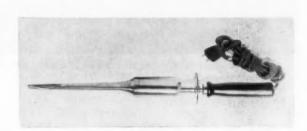
3. Cab and Running Gear. Cab areas can be modernized to give better accessibility of equipment and the improved location of control and power circuit wiring found in current production locomotives. New wheel slip-slide indicating equipment can be applied to trucks and cabs.

Undoubtedly, the greatest benefit can be derived from modernization only when it is done on a complete locomotive basis. Therefore, the job can best be done when the locomotive is scheduled for a general overhaul, either in the railroad's shop or in the manufacturer's repair facilities.

Need to Modernize

Today, advance is the price of survival. Competition is becoming more severe as our economy returns to normalcy. Every business must keep pace with product development and progress in its field if it is to survive. Plant and equipment must constantly be improved to better serve existing customers and attract new sources of business.

The railroads are no exception to this rule. Competition abounds in the tremendous and growing business of moving goods and people. In the diesel-electric locomotive the railroads have a revolutionary motive power tool. But, like any other tool, it must be kept up to date. Only then can it give maximum benefit to the railroad enterprise—doing its full share toward increasing business volume and profits.



Repairing Battery Sealing Compound

Substituting a brass screw driver blade, 10-in. long, in place of the copper tip on a conventional electric soldering iron, results in a tool which simplifies repair and renewal of the battery sealing compound around the edges of the case. The brass blade heats well all the way down to the tip and is used to melt the compound while proceeding slowly around the edges.

The use of the iron has been found to simplify and speed up the removal of old compound before applying new around the edges, to remove all the compound for complete re-sealing, or just to go over and melt in small cracks.



One-Way and No-Go Locomotives

By Gordon Taylor

It is surprising what small things will cause a diesel locomotive to fail; causing bad delays and reduction of tonnage. We have had two such cases recently.

CASE No. 1. Recently a four-unit diesel failed to make Grindstone Hill for lack of power. One unit simply refused to load up. The B-field and shunt-field contactors would not come in.

It was then decided to reduce tonnage and double the hill. To make that move, it was necessary to back up the train and set out some of the cars. When the back-up move was made, the generator suddenly got busy and went to work.

That brought up a new question. Why would the unit load up in reverse, but not in forward direction? A quick check of the power reverser in the high voltage cabinet provided the answer.

The interlocks on the forward reverser contactor were dirty. The contacts were polished, and the locomotive was back in business again.

CASE No. 2. A two-unit GP-7 locomotive was going about its business with everything working all right. Suddenly one of the units dropped its load, and nothing that the crew could think of would get it going again.

As a result, the tonnage was cut to single-unit rating. The defective unit was set aside, and a call made for help. A foreman and electrician responded to the call, making the long drive by auto, and quickly located the trouble.

You have probably guessed what they found. Yes, it was the FE interlocks, located at the top of the reverser. They were worn and loose. When operating at high speed over rough track, the contacts would fail, causing the power contactors to drop in and out, resulting in ground relay action.

This article is based on actual experiences of men who operate and maintain diesel-electric lucomotives.

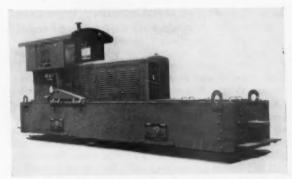


A foreman and an electrician responded to the call, making the long trip by auto.

Lesson to Be Learned

When there is complete failure of the power system, it is well to stop and think what electrical connections are necessary to set up the circuits necessary to excite the main generator, and to make it possible for the various power contactors to close.

Near the head of the list of such connections you will find the interlocks in the reverser, located at top of reverser drum. Do not fail to look at them, especially if the unit operates satisfactorily in one direction, but not the other.



DIESEL ORE-CAR PUSHER. The diesel-electric locomotive is now giving competition to the electric locomotives generally used for moving cars on ship loading docks. The unit pictured is a 65-ton diesel-electric pusher locomotive built by the Atlas Car & Manufacturing Company.



Each car is a motor car and is powered by four 100-hp, direct current motors.

M.U. Cars to Improve New Haven Commuter Service

Use of rectifier type m.u. cars in quantity will establish value of this type of motive power for future application

THE FIRST OF AN ORDER for 100 rectifier type, m.u. commuter cars was delivered to the New Haven on February 16, 1954. The cars are under construction at the Worcester, Mass., plant of the Pullman-Standard Car Manufacturing Company, and the tentative schedule of delivery is such that all 100 units will have been completed and placed in service by the week of September 20.

The 100 cars are made up of 39, 120-passenger coaches, 7, 92-passenger, combination passenger and baggage cars, 3, 65-passanger club cars for Special Car Associates and 1 passenger club car for New Canaan Group.

The cars are of all steel construction, having stainless

steel exterior sheathing and fluting applied to each side of the car. The underframe and superstructure framing and the vestibules are made of high-tensile strength steel, which is being used, as in all post war passenger car equipment, to gain a considerable saving in weight over the carbon steel used in pre-war design. The roofs and ends of the cars are painted and the sides are natural finish stainless steel.

Each car is equipped with eigh-ton electro-mechanical air conditioning, which diffuses the conditioned air into the interior of the car. An added feature has been built into this air conditioning system to provide emergency



Headlinings are bone white, bulkhead walls powder blue, and wainscoting below the windows a dark blue. Each coach seats 120 passengers.

ventilation in the event of a power loss or air conditioning failure enroute.

All 100 cars will be equipped with Westinghouse Electric Corporation power propulsion equipment, especially designed for these new cars. This power equipment is an entirely new design and was described in the March 15, 1954 issue of the Railway Age. It is known as rectifier type equipment, and the basic principles involved permit rectifying or converting 11,000-volt, 25-cycle, a.c. current to 600-volt, d.c. current. The chief advantages revolve about the use of d.c. traction motors similar to those used widely on diesel locomotive construction of a standard and tried design, considerable weight saving and the elimination of duplicate equipment to handle a.c. and d.c. current separately. It is estimated there is a potential weight saving of approximately 20,000 lb. in the use of this special power propulsion equipment over conventional a.c. - d.c. equipment now in use on older New Haven cars equipped with series a.c.-d.c. motors.

Each of the 100 new cars will be a power car, the trucks of which will be equipped with two 100-hp., truck-mounted straight d.c. traction motors, one per axle, for a total of 4 traction motors per car, or 400 hp. per car, adding up to 4,800 hp. for a given 12-car train. The present latest type motor cars to be retained in service, and which are capable of hauling three trailer cars per motor car, are equipped with four 250-hp., a.c.-d.c. traction motors, for a total of 1,000 hp. per car, which for a given train of 12 cars, including 3 motor cars and 9 trailer cars, would add up to 3,000 hp. It is obvious, therefore, that the operating performance of the new cars is considerably superior to the latest type of present cars now in service and will result

in increased acceleration rates and reduced over-all running time compared to the older equipment.

The cars have been designed for a maximum speed of 30 m.p.h. and an average acceleration rate of 1.0 m.p.h. per second on level tangent track, based on 14 intermediate stops. The braking system which will be applied to these cars will provide an approximate average retardation rate of $1\frac{1}{2}$ m.p.h. per second.

Each care is equipped with four-wheel inside swing hanger type, all coil spring suspension trucks. Truck frames and bolsters are of cast steel and the spring suspension is controlled by a hydraulic shock absorber mounted on each side of the truck. Heavy duty, 6-in. x 11-in. roller bearings, are applied to the journal end of each axle. Trucks are equipped with latest design clasp brake rigging, utilizing truck-mounted brake cylinders. Wheels are 36-in. multiple wear rolled steel with AAR contour. The design features have been predicated on producing considerably better riding conditions than obtained in older style cars equipped with conventional trucks.

All 100 cars will be equipped with the Westinghouse Air Brake Company's high-speed control, electro-mechanical brake equipment, which includes all the latest air brake features developed to date. Air for the system is supplied from a 600-volt, d.c. motor-driven air compressor which operates at all times while the care is energized, either on a.c. or d.c. Each car is equipped with a manually operated power type hand brake, one located in the vestibule at each end of the car.

Each of the new motor cars has a single-type pantograph mounted on the roof at the toilet end of the car, which serves to collect the 11,000-volt, a.c. current from



Each car is equipped with headlights and electric markers. Operator's compartments are all well insulated and heated.

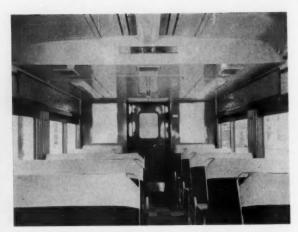
the overhead transmission lines. Each side of each truck is equipped with conventional type 600-volt, d.c. third rail current collector shoe assemblies.

Operator's compartments are adequately heated, thoroughly insulated and have shatterproof glass throughout.

Conventional design wide vestibules having exit openings as wide as on mainline postwar passenger equipment are provided on each end of each car. Open, fixed type stainless steel platform steps with non-skid treads are used.

The cars are heated by electric side wall heaters, end blower heaters and overhead heat, all under Minneapolis-Honeywell electronic control. The heating system has been designed so that in mild weather the heat is provided by an overhead heating unit which tempers the incoming air to the air conditioning unit. This overhead heat is controlled in three stages and varies automatically with a drop in temperature. When the temperature drop is severe enough the side wall heat is automatically applied to the car. The end blower heaters located on the inside of the body entrance doors provide heat automatically to prevent cold drafts at the ends of the passenger compartment, resulting from the frequent opening of body end doors. The entire floor of the passenger compartment is covered with 3/16-in. thick heavy duty 9-in. square rubber tiles.

The new cars are all equipped with fluorescent lighting throughout the interior, which provides approximately 20 footcandles of illumination at the reading level. This is more than double the light intensity in the older m.u. cars. Each car is equipped with an electro-mechanical water cooler, a single toilet room having flush-type toilet and cold wash water. The side windows in the passenger compartments are modern breather type double-glazed



The No. 2 or air conditioning unit end of one of the coaches.

sash with Solex heat resistant glass on the outside and shatterproof glass on the inside. This type of window will remain clear at all times barring damage from an outside source. The entire body of the car is thermally insulated by the use of 2-in. to 3-in. thick Johns-Manville insulation. This particular type of insulation also has high acoustical values.

The interior decorative scheme follows the pattern of the post-war passenger coaches, utilizing bone white headlining, powder blue bulkhead walls and dark blue lower wainscoting below the windows. The seats are upholstered in New Haven standard blue mohair similar to the seats in the post war passenger cars.



A 200,000-KW GENERATOR on the last lap of its journey from the Westinghouse Electric Corporation plant in Pittsburgh, Pa., to the Consolidated Edison East River Power Plant in New York City. Weighing 196 tons, the unit was shipped by a special drop-center flat car to a New Jersey pier and floated by barge to the East River where the Merritt-Chapman & Scott crane Monarch lifted it onto a many-wheeled trailer for delivery to its final location.

Maintaining Diesel Locomotive Electrical Equipment



Commutators should be inspected frequently for commutator bar burning and picking or dragging of copper.

Part II

Commutators and Brushholders

Maintenance of commutators and brushholders consists, in addition to periodic cleaning and the replacing of worn out and damaged brushes, of checking to see that all brushes move freely in the holders and that all connections to brushholders are tight. Fingers should be checked periodically for correct pressure. After the first month or two in service and at six months, and at the first annual, it will be found good practice to tighten -with a wrench-the brushholder electrical connections.

The distance of the brushholders from the commutator should be checked occasionally-more frequently during the initial service. Sometimes they will be found to move under the heavy vibration encountered and will require

resetting and tightening.

The proper setting of the generator brushholders is particularly important. In these machines, the brushes are inclined to the commutator surface because better riding characteristics are obtained by this arrangement. However, the position of the brush on the commutator is altered, if the brushholders are not kept uniformly at the proper distance from the commutator.

The brush grades recommended by the builder are the safest grades to use. Brush manufacturers frequently offer new grades or modifications to improve the performance of their product. Where new grades are applied, the commutator should be inspected frequently for commutator bar burning and picking or dragging of copper, all of which can contribute materially to deBy W. H. Eunson and T. L. Weybrew

structive flashing. Long brush life at the expense of increased commutator resurfacing is certainly not attractive.

Commutator surfaces wear, generally in an irregular pattern forming a series of small flats. When these flats become pronounced, the brushes either wear rapidly or are broken, thereby increasing the danger of flashing due

to the increased sparking which results.

The exact degree of flat, measured by its depth or divergence from a true cylinder, at which it is necessary to resurface the commutator varies with the service requirements. Where high sustained commutator or armature speeds are required, flats of one or two mils in depth may cause sufficient brush and commutator distress to demand resurfacing. In service requiring only moderately high sustained speeds, flats of five to ten mils in depth have been observed in regular service without distress.

On some properties a complete record of all brush replacements is kept. Such a record, by showing the rate and cause of brush removal, frequently indicates when

commutator resurfacing is required.

Most commutators today, due to improved manufacturing procedures, will not require tightening. Resurfacing, together with undercutting of slots, removal of feather edges and thorough cleaning of the slots will keep the commutators in good condition. Where a brush record is kept, however, the need for frequent resurfacing usually indicates structure instability in the commutator requiring a tightening operation following the methods and procedures obtained from the manufacturer.

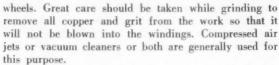
Commutator resurfacing, when found necessary between overhaul periods can be done with small grinding attachments. Usually one or more brushholders are removed and the grinder, with suitable adapters, is clamped in the brushholder supports. The generator armature can be rotated by the engine at suitable speeds. Motor armatures can be rotated by applying power from a d.c. welding set, from the auxiliary generator, or from a separate m.g. set, adjusting the voltage to obtain the desired speed. In this case, the operator will be working on a "hot" machine but the voltage will be low and hence involve little hazard. As a safety measure, the midpoint of this circuit may be grounded or the brushholder at the same polarity point as the grinder may be grounded, reducing the hazard to minor considerations.

This grinding can be done on motor commutators under the locomotive, if the wheels can be raised from the rail and supported without endangering the journals. This, of course, is the case where anti-friction journal bearings are used. When this is done, the operator must be protected from accidental contact with the rotating

Both authors are in the Transportation and Generator Engineering Department Westinghouse Electric Corporation, East Pittsburgh, Pa.



Freshening grease is needed every six months for generator bearings or excessive cage wear can be expected.

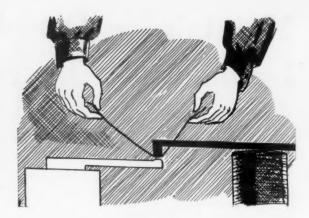


In any of the resurfacing operations required with machines in place, the space available prevents the use of anything but a small and not too substantial grinding attachment. Creditable surfaces can be produced but they frequently leave something to be desired. Emphasis, therefore, should be placed on the resurfacing at general overhaul. If a high quality product of contour and surface finish is obtained at that time, a reduction in the number of commutators requiring resurfacing between such overhaul periods can be expected.

Between the extreme outer end of the commutator bars and the steel clamping ring lies a creepage surface which is referred to as the string band. This surface is particularly exposed to carbon dust, dirt and, unfortunately, water and oil vapors carried into the motor by the ventilating air. This string band generally requires frequent cleaning and periodic coating with air drying insulating varnish. It should be sanded off to prevent excessive build up and cracking and also to produce as smooth a surface as possible. Cleaning by wiping at each monthly inspection is generally required. Revarnishing at annual is good practice in most locations. If flashovers occur, commutator surface should be cleaned by sanding, by cleaning out the commutator slots and by sanding and revarnishing the string bands, before the locomotive is returned to service. It is also necessary to inspect the brushholders for excessive burning of the boxes and fingers and the brushes for breakage and damaged shunts. Insulators may also be broken. All damaged parts must be replaced before the locomotive is again used.

Frames

The motor frames, mounted in the truck, are subject to severe vibration and pounding and will require some maintenance such as the building up and remachining of worn and distorted parts. At general overhaul, the frames should be checked to dimensions furnished by the manufacturers and corrected as necessary. Wear and distortion will be found usually in axle bearing caps and seats and in the nose used for suspending the motor at



Contacts must be kept clean and tight. Some may be sand papered and some should not.

the truck cross member or transom. If derailments have occurred the motor frame and parts can be so badly distorted that extensive building up and repairing will require frame annealing or normalizing to prevent further relaxing and distortion. In such extreme cases, the replacement of the frame should be given full economic consideration.

Armature bearing seats, after a long time in service, show wear, or peening out and require rebuilding to prevent bearing races from becoming slightly loose. This condition results in excessive internal bearing clearance, and increased rate of wear of the bearing seats. The seats in the housing can be built up by welding and remachined. Building up of such parts by metal spray has been tried but has resulted in so many failures that it can only be considered a hazardous procedure.

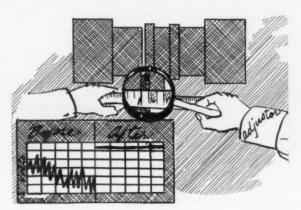
Bearings

Armature bearings of motors and generators at present are of the anti-friction type. Roller bearings are used on the main machines and either roller or ball bearings on auxiliaries. The bearing housings contain cavities for a supply of grease, which is sufficient for a long time of service. The quantity of grease, however, is less important than its bleeding rate and its ability to retain this rate for an extended period of service. This is the characteristic by which the grease furnished the small amount of lubrication required by the bearing for control of roller and cage friction.

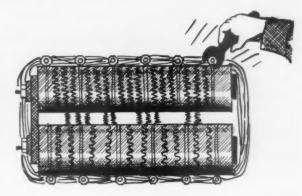
Great effort has been made to produce a grease which will be stable and which will retain its bleeding characteristics at least for the period between general overhauls. This effort has in general been successful for the traction motor bearings with overhaul periods of 300,000 to 400,000 miles or 4 years.

Similar greases and enclosures in the main generators using spherical roller bearings have not met with the same success. At present, we recommend that small amounts of freshening grease be added to the bearings every six months. If this is not done, excessive cage wear can be expected which greatly increases the hazard of bearing failures.

Auxiliary motors and generators are regreased with the main generators principally because of the convenience of carrying through a uniform schedule of lubrication. On some of the auxiliary machines, however, factory



Adjustment of load regulators is highly important to good locomotive



If resistor contacts are not kept tight, the resistance will be in the wrong place—and concentrated!

lubricated and sealed bearings have been applied with very promising results.

At overhaul, there is always the question of how to inspect, and decide which bearings can be used. Fortunately, however, a number of bearing manufacturers offer the advantages of factory inspection and replacement of worn parts or complete bearings as necessary. This action may appear to increase the costs of maintenance, but is not nearly so expensive as bearing failures.

Traction motor axle bearings are of the sleeve type. Conventional anti-friction bearings generally cannot be used in this location because the increased radial dimensions required by such bearings prevent the use of the maximum gear ratio otherwise obtainable.

Improvements in the life of axle bearings has been obtained by the use of felt wick lubricators. At wheel turning periods, these lubricators should be carefully examined for excessive wear and for glazing of contact surfaces. Worn parts can be replaced and surface glazing of the wick can be removed by the use of a small brush similar to those used for fingernail cleaning.

Axle bearings should also be examined for wear at wheel turning and worn bearings should be replaced. On locomotives in road service, we recommend replacing these bearings when the radial clearance exceeds $\frac{1}{16}$ in. and the flange wear exceeds $\frac{3}{32}$ in. on either flange. If badly worn bearings are continued in service, gearing wear and frame distortion will be increased.

Both gears and pinions are heavily loaded and in practice the tooth faces rub against each other, rolling only at one point when the center is at the theoretically correct dimension. Bearing wear increases the ratio of gearing tooth wear. Gearing maintenance is generally grouped with motor maintenance. Gear cases should be inspected frequently and kept supplied with the proper amount of gear lubricant. At each wheel turning, gears and pinions should be inspected and if the teeth are cracked, badly spalled or worn to nearly a knife edge on the top, they should be replaced.

The control system governs the speed and power developed by the engine and its transmission by generator and motors to the locomotive wheels. Connection of the motors to the generator in both motoring and dynamic braking as well as excitation of the main and auxiliary machines are involved. Proper functioning of the various parts of the control apparatus is essential.

Neglect in the care of the control apparatus often results in expensive motor or generator damage. Failure of transition of field shunt control relays may result in excessive current in the generator and motors, sometimes ending in wreckage of the complete machine. In the other direction, such failure may cause underloading of the engine and poor locomotive performance. Neglect of the engine load regulator unit causes over- or underloading of the diesel engine with either engine damage or low power respectively.

Protective devices, such as wheel slip relays and ground relays, which are intended to protect the rotating machines from abuse and damage, may be inoperative without interfering with the performance of the locomotive. Such items may be overlooked and regular care and checks of their operation are necessary to prevent serious damage to machines.

In making inspections and repairing apparatus which has failed, the instruction and maintenance books furnished by builders should be followed closely. These books describe methods for dismantling apparatus, care of parts, relay settings, wear limits and, to some extent, the types of tools used to perform the work. It is not desirable to include such detailed data here. However, some phases of the work apply to all sizes and types of locomotives.

Contacts

Many types of contacts from those in the heavy current main circuit down to relay contacts carrying only milliamperes are involved. All must be kept clean and tight on their supports. Circuit failure occurs more often from neglect here than in any other phase. Electro-pneumatic switches are used generally for main circuits. Some burning due to arc rupturing occurs on such contacts and is not normally harmful because it does not occur on the heel surface which completes the circuit in the switchclosed position. Switch contacts are usually designed to roll into the closed position. Occasional removal of the burned surface with a fine file is recommended. Contacts of magnetically operated contactors used in engine starting, excitation and auxiliary generator and motor circuits require the same treatment. Some of these contacts are of small size and sandpaper strips for cleaning are better.

Relay and interlock contacts are usually of the silver button type, and burning should not occur on such contacts. Cleaning consists of wiping to remove foreign material such as dust or dirt and film. In extreme cases, cautious use of fine sandpaper is desirable. Similar treatment is given the contact surfaces of fingers and drum surfaces of the reverser. These are of the sliding type, and dirt at these points causes grooving of the drum surface which must be polished off. Such sliding contacts are the only ones requiring lubrication, and a film of light oil is recommended after cleaning. The pressure between contacts should be checked and kept within recommended limits, particularly in places where high currents must be carried. When installing new contacts, the supporting surface must be clean to prevent heating at this point.

Pneumatic Apparatus

The reverser dynamic braking switch and unit switches are operated by air cylinders. The piston packing consists of leather or neoprene cups. Clean, dry compressed air is required, filters must be cleaned regularly and water which condenses in the system must be drained. Such precautions benefit the air brake apparatus also. Water corrodes the cylinder walls of the control apparatus and prevents its operation. The cylinder caps must be removed occasionally and the parts cleaned. A special oil is specified in most cases at three to six month intervals. Magnet valves which control the compressed air usually require little attention for cleaning occasionally and replacement of worn parts at heavy overhaul.

Regulators

A regulator varies the excitation of the auxiliary generator to hold constant voltage throughout the speed range of the engine. This generator supplies power for charging the storage battery and for most control circuits. The importance of these functions to proper operation makes good maintenance of the regulator necessary. Several types of regulators are in use but all require periodic operational checks, adjustment and contact care.

The load regulator, usually of the hydraulic rheostat type, which varies excitation and hence generator voltage to prevent engine overload requires regular inspection and occasional check at full load to obtain best results. The signal for the load regulator comes from a valve associated with the engine speed governor, and its performance and adjustment should also be checked.

Wiring and Connections

All parts of the locomotive are subjected to the severe vibration common to all rolling stock plus that originating in the reciprocating engine. All bolted points must be kept tight to prevent breakage and damage. This includes the mounting bolts and mechanical connections of the apparatus and, more particularly, the electrical connections at studs and terminal boards. Occasional tightening is required, particularly when new. Cleats and clamps supporting the heavier cables should be included because looseness allows chafing of insulation and grounds to develop. Resistor connections are especially likely to loosen because of expansion and contraction due to temperature changes in operation. Monthly checks for tightness are recommended on new locomotives. The heavy current drawn from the battery during engine starting makes tight connections imperative in the wiring and apparatus included in this circuit. Inspection of the connections between battery cells and trays for corrosion causing high resistance is required. Battery care, including regular addition of water, avoiding overcharge, gravity testing and recording will result in longer and better service from the battery.

Only some of the more important phases of locomotive maintenance have been mentioned. They are ones where neglect will cause expensive damage and operational failure. The importance of continued improvement in design features of the electrical equipment and other locomotive parts is fully realized, and has been made and will continue. Improvement in maintenance offers the best chance for reducing operating costs of existing locomotives.



No Slip or Slop On Snow-Free Steps

Commuters using the Pennsylvania's Suburban Station in Philadelphia, Pa., next winter will find the steps of both the 16th and 17th street entrances free of ice and snow at all times, regardless of the weather. There will be no shoveling of snow to keep the steps clear, either, because as the picture shows, the railroad is installing electric heating cable manufactured by the General Electric Company, Bridgeport 2, Conn., in the concrete steps. When this cable is energized, it warms up and melts the snow and ice.

According to the Harry F. Ortlip Company, designers of the installation, electric heating cable of this type is much more effective than the old-fashioned snow shovel which it replaces. Without the heating cable installation, railroad forces would probably have to shovel snow off the steps several times during one storm, because of the hazards involved in letting the snow remain until the storm has subsided. The heating cable doesn't let the snow accumulate.

Guestions and Answers

Interchange Rules

This is the seventh installment of a series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs to, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirement of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, come from a background of intimate association with the application of the rules. Obviously, comments or opinions as of today, may be inapplicable after a revision of the rules or further interpretations by the Arbitration Committee.—Editor.

74-Q.—In cases where all of the items on billing repair card are chargeable versus car owner, is it necessary to specify "Bill Owner" at the top of such billing repair card? A.—No.

75-Q.—What is the correct material charge for items consisting of steel plates and other structural steel details fabricated in railroad shops and riveted together?

A.—Charge for items consisting of steel plates and other structural steel details fabricated in own shops and riveted together should be on the basis of Item 188-A of

76-Q.—What is the proper basis for labor charge on authority of defect card for cleaning and painting exterior of tank car?

A.—Labor charge for cleaning and painting exterior of tank car should be on the basis of actual time consumed at rate specified in Item 92 of Rule 107, plus material charge for sandblasting sand used.

77-Q.—Who is responsible for curtains found missing in passenger coach upon arrival at destination after movement under revenue billing from the builders to the car owner?

A .- Car owner.

78-Q.—In cases where brake beam safety support is renewed account missing and there is no stenciling to indicate type standard to car, would the type of brake beam safety support at the opposite end of the car establish the owner's standard?

A.—The Rules do not provide definite means for determining car owner's standard for brake beam safety supports in the absence of stenciling on car to indicate such standard. In cases where the repairing line cannot determine kind of support standard to car at time of repairs and a dispute results as to charges, the car owner must submit joint evidence regarding kind of support standard to car to support his claim.

79-Q.—In cases where brake shaft is cut off account road clearance and such repairs do not result in violation of any of the requirements of United States Safety Appliances, would such work be considered as improper repairs? A.—No.

80-Q.—Who is responsible for bent cross ties caused by derailment where there is no other associated cardable damage on car?

A.—Such damage is cardable in interchange unless of a slight nature as outlined in Paragraph (b-1) of Rule 4 in which case same would not be cardable.

Schedule 24 RL Air Brakes

1711-Q.—What do the numbers following the letters indicate?

A.—The numbers following these letters indicate the position of the contacts from the top of each stack, *I* being the top contact, *2* being the second from the top etc.

1712-Q.—Give an example.

A.—As an example a contact identified as C3 would be the third contact from the top in the stack, which is the third from the left when viewed from the front of the relay.

1713-Q.—How does Plate 6 compare with Plate 5?

A.—Plate 6 is similar to Plate 5, but resistors have been added, viz, R1, R2, R3 and R15.

1714-Q.—How does Resistor R15 function?

A.—R15, placed in series with the coil of relay U to provide satisfactory operation from the nominal 72 volt circuit of the locomotive and serves to limit the power consumed in the relay coil to a safe value.

1715-Q.—In what other way does resistor 15 function?

A.—It also serves to limit the charging current to the condenser used to make relay *U* a slow release relay. The condenser will be shown later.

1716-Q.—Why is resistor R13 provided?

A.—R13 is provided for the same reason, but is connected in series with relays V, W and X. This one resistor can be used for all three relays.

1717-Q.—What is essential in the Wheatstone bridge? A.—That the two arms be accurately balanced.

1718-Q.—Referring to Plate 6, in order for the bridge to be balanced, how must the resistors concerned be lined up? A.—Resistor R4 must be equal to the sum of R5 and R6.

1719-Q .- What is the resistance of R6?

A.—R6 is the temperature compensating coil and is accurately wound to 20 ohms.

1720-Q.—Such being the case, how would R4 and R5 have to be adjusted?

A.—Since the resistance of each bridge arm must be 50 ohms, R4 would have to be accurately adjusted to 50 ohms and R5 to 30 ohms.

1721-Q.—What provision is made to avoid the necessity for setting these resistors so closely for accurate balance?

A.—It was decided to use fixed values of resistance for R4 and R5, and to insert R3 in between these two resistors.

1722-Q.—Describe this arrangement further.

A.—Since this resistor can have a low value, the adjustment for balance becomes rather simple. In setting the arms of the bridge with resistor R3, the adjustment must be such that the sum of R4 and the upper portion of R3 must equal R5 plus the lower portion of R3 plus 20 ohms.

1723-Q.—What is the purpose of resistors R1 and R2?

A.—They are used to limit the current flow from the battery through the Wheatstone bridge and to adjust the sensitivity of the bridge.

1724-Q.—Dot he operating values of detector relay Y vary to any extent?

A.—The operating values vary within acceptable manufacturing tolerances.

1725-Q.—In view of this variation what arrangement is necessary in order to obtain the required sensitivity?

A.—It is necessary to provide some adjustment whereby the correct over-all sensitivity can be obtained in spite of these manufacturing tolerances.

1726-Q.—What is the remedy in this case? A.—Resistor R2 is made adjustable.

SC-2-A CIRCUIT CHECKING EQUIPMENT

1727-Q.—Explain the adjustment of this resistor.

A.—In setting the adjustment of this resistor, the bridge is balanced for a train line resistance representing 15 cars.

1728-Q.—How are the two dials set? A.—The two dials are set for 15 cars.

1729-Q.—How should the bridge then be balanced? A.—So that the milliameter reads zero current.

1730-Q.—What determines the coding of the bridge?
A.—The bridge is allowed to code by the proper positioning of the lever switch as will be explained later.

1731-Q.—When should coding of the relays stop?

A.—The rheostat dial is gradually turned toward a lesser number of vehicles and coding of the relays should stop when the dial reads approximately 13.5 vehicles.

1732-Q.—What action may be necessary to cause the stopping of relay coding at the dial setting?

A.—Resistor 2 should be adjusted if necessary, to obtain the desired results.

1733-Q.—What should be noted when attempting to follow the Plates on this subject?

A.—It should be noted that the resistors in Plate 6 are shown in heavy lines. On the next figure these resistors will be indicated by the standard width of line and the new details added in Plate 7 will be shown in heavy lines. This procedure is followed throughout all of the remaining diagrams.

1734-Q.—What is the advantage of this arrangement?

A.—If one particular detail in the circuits is in question, the sheets of this pamphlet can be leafed through rapidly until the particular detail is indicated by heavy lines. A description will then be found in the explanation associated with that particular figure.

1735-Q.—In review, which arms of the bridge are short-circuited and how is this accomplished?

A.—It will be recalled that contact C4-C5 of relay W is used to short-circuit the rheostat arm, and contact C2-C3 of relay X is used to short-circuit the magnet train line arm of the bridge.

1736-Q.—In what way can the efficiency of the bridge be materially improved?

A.—By short-circuiting the remaining arms of the bridge.

1737-Q.—What has been done to effect this improvement? A.—C2-C3 of relay W, Plate 7 has been added.

1738-Q.—What is the result of this arrangement?
A.—The R5-R6 arm of the bridge is short-circuited and

1739-Q.—What other addition has been made? A.—Contact C4-C5 of relay X has been added.

1740-Q.—What results from this addition?

the rheostat arm is shorted.

A.—The arm (R4) of the bridge is short-circuited when the magnet train line arm is shorted.

1741-Q.—Does the addition of condenser C across the lower left arm of the bridge assist in maintaining balance on the bridge?

A.—No. This condenser serves to compensate for the inductance of the compensating coil R6.

1742-Q.—In review, what type relays are W and X?

A.—It was previously mentioned that they are time delay relays.

1743-Q.—How is this time delay obtained?

A.—Referring to Chart 8, when the directional relay V is in the left hand position closing contact B6-B8, full battery voltage is available for charging condenser C2.

1744-Q.—What happens when relay V operates to the right?

A.—Condenser C2 will discharge through the coil of relay W.

1745-Q.—What limits this discharge current? A.—The resistance of R14.

Diesel-Electric Locomotives*

1025-Q.—What is a feature in connection with the gear?

A.—The gear is calibrated to serve as an engine timing reference.

1026-Q.—Describe the bracket which carries the worm.

A.—The bracket is pivoted so that the turning device may be easily engaged or disengaged, a steel pin securing it in either position.

1027-Q.—Is there any likelihood of accidental contact between the worm and timing gear?

A.—No. The device is incorporated with a safety spring to prevent such an occurrence.

1028-Q.—Describe the operation when engaging the worm with the timing gear.

A.—Unscrew the positioning pin until the swing bracket

*This series of questions and answers relates specifically to the Alco-G.E. diesel electric locomotives. The figure numbers and references, by number, to diagrams, etc., relate to the current edition of the Alco-G.E. operating and maintenance manual.

is free. Lower the assembly carefully until the gears have made contact. It may be necessary to turn the worm slightly until the teeth mesh.

1029-Q.—When the teeth are meshed, what should be done?

A. Engage the positioning pin in upper hole on side of swing bracket and tighten.

1030-Q.—What operation is necessary to disengage the worm from the worm gear?

A.—Unscrew the positioning pin until the swing bracket is free. Swing the assembly upwards until the positioning pin lines up with the lower hole in the side of swing bracket and lock it in this position.

1031-Q.—What precaution must always be taken?

A.—Do not attempt to start the Diesel engine with the turning device engaged.

REMOVAL-TIMING GEAR AND WORM ASSEMBLY

1032-Q.—What must first be done when attempting to remove the turning gear?

A .- Remove the water pump.

1033-Q .- What is the next step?

A.—If engine is in the locomotive, move the air compressor so that the driving hub of the flexible coupling may be removed.

1034-Q.—What should follow?

A.—Remove both right and left bank timing pointers. Bend back locking lugs on washer between lock nut and turning gear and remove nut and washer.

1035-Q.—What is the final operation?

A.—With gear puller applied to the tapped holes in the gear hub, remove timing gear.

1036-Q.—How is the worm assembly removed?

A.—With the device dis-engaged remove the dowels from the mounting bracket. Unhook the safety spring. Remove capscrews and mounting bracket.

DISASSEMBLY-WORM ASSEMBLY

1037-Q.—What must be done to separate the swing bracket from the mounting bracket?

A.—Remove the positioning pin, pull cotter pins holding fulcrum shaft in place and remove shaft.

1038-Q.—How is the positioning rod and spring removed? A.—Drive the rod out with the sleeve through the sleeve end.

1039-Q.—What must be done to remove the worm from worm shaft?

A.—To remove the worm from the worm shaft, drive out the tapered dowel holding the worm to the shaft and remove the shaft with thrust bearings.

1040-Q.—What should be done at overhaul periods?

A.—The device should be dismantled and the component parts thoroughly examined. In reassembling lubricate all working parts.

REASSEMBLY—WORM ASSEMBLY

1041-Q.—When assembling the worm assembly what should be done first?

A.—Place positioning rod with spring in swing bracket and press in the sleeve until it is flush with the end of the swing bracket. 1042-Q .- What should follow?

A.—With the thrust bearings and worm in place in swing bracket, apply the worm shaft and dowel. Open up the split in the dowel at assembly.

1043-Q.—What is the final operation?

A.—With the swing bracket in place in the mounting bracket, apply fulcrum shaft and cotter.

INSTALLATION-TIMING GEAR

1044-Q.—What inspection should be made previous to the application of gear?

A.—Make sure bore of gear is free of nicks and high spots and key is free of nicks and properly applied in shaft keyway.

1045-Q.—What precaution should be observed when applying the gear?

A.—When applying the gear to shaft make sure the letters and numerals face the air compressor.

1046-Q.—What is the next operation?

A.—With a soft hammer, tap the gear in place until it shoulders on the shaft. Apply lock washer and securely tighten lock nut. Lock with washer lugs.

1047-Q.—What should then be done?

A.—Replace flexible coupling hub and air compressor. Replace water pump.

1048-Q.—What is the procedure for installing the worm assembly $\mbox{\it ?}$

A.—Mount assembly to turbosupercharger support, dowel and tighten capscrews.

1049-Q.—What is required if a new mounting bracket is applied?

A.—The assembly should first be leveled, bracket shimmed if necessary to center worm and worm gear when engaged.

1050-Q.—What should finally be done?

A.—Gear back lash should be checked (see Table of Clearance) and bracket doweled.

TIMING POINTER LOCATION

1051-Q.—Is it important that the location of the timing pointers be accurate?

A.—It is of utmost importance that the timing pointers be accurately located.

1052-Q.—How are the pointers located normally?

A.—Normally, the pointers are located after the No. 1 crankpin has been located at top vertical center by tramming between the tram mark on the worm gear and the tram marks on the mounting bracket, Figs. 3 and 4.

1053-Q.—Where are the timing pointers located?

A.—The right bank timing pointer is located $22\frac{1}{2}$ deg. above the No. 1 marking on the worm gear, while the left bank timing pointer is located $22\frac{1}{2}$ deg. below this mark.

1054-Q.—What procedure is recommended in the event that the normal method of locating the pointers cannot be used?

A.—Apply the right bank timing pointer for use as a reference point. Rotate crankshaft until right No. 1 piston is near top dead center on the up stroke.

1055-Q.—What action should follow?

A .- With the operating stem of a dial indicator resting on

the piston crown, rotate crankshaft, observing dial indicator.

1056-Q.—What happens when the piston passes through top dead center?

A.—It will be noted that the indicator will stop at this point.

1057-Q.—What should now be done?

A.—Continue crankshaft rotation until dial indicator shows .020 in. movement past top dead center—Mark the worm gear at the pointer.

1058-Q.—What action should now be taken?

A.—Reverse rotation of crankshaft until the dial indicator goes .020 in. past top dead center and again mark the worm gear at the pointer.

1059-Q .- What should follow?

A.—Locate and mark a point midway between these two marks.

1060-Q .- What does this mark indicate?

A.—This new mark is top dead center for the right number I piston.

1061-Q.—What should be done after this mark has been located?

A.—Measure the distance if any, between this midpoint and the number 1 marking permanently scribed on the worm gear.

1061-Q.—In case that there is any distance resulting, what is the indication?

A.—This is the distance the pointer must be moved to accurately locate it.

1063-Q.—What should be done if the No. I mark is above the mid point?

A.—Move the pointer the measured distance toward the number 1 mark.

1064-Q.—What should be the action if the number 1 mark is below the midpoint?

A.—Move the pointer away from the number 1 mark equal to the distance measured.

1065-Q.—At what point is the left bank timing pointer located?

A.-45 deg. from the right bank timing pointer.

AIR INTAKE MANIFOLD

1066-Q .- How is the air intake manifold made up?

A.—The air intake manifold is formed by enclosing the *V* in the engine block with sectional covers.

1067-Q.—Describe the covers.

A .- All covers are castings.

1068-Q.—How is the air conducted to the cylinder heads? A.—Elbows cast integral with the sectional covers conduct air to the individual cylinder heads.

REMOVAL

1069-Q.—What is the procedure for removal of the sectional covers?

A.—Remove the exhaust manifold, turbosupercharger and cylinder heads.

1070-Q .- What should follow?

A.—Remove machine bolts, lock nuts and aluminum flat washers fastening covers to each other. Remove metal gasket between sectional covers. 1071-Q.—How should the sectional covers be removed?

A.—Remove each sectional cover separately. Remove capscrews, lock washers and aluminum flat washers fastening air manifold covers to engine frame.

1072-Q.—What inspection should be made after removal of sectional covers?

A.—Clean and surface inspect the V of the engine block as well as each sectional cover, making sure that all gasket material has been removed.

INSTALLATION

1073-Q.—What are the initial operations when about to install the sectional covers?

A.—Apply P.O.B. gasket maker number 1 or equivalent to top of V then apply turbosupercharger end sectional cover to frame.

1074-Q.—What should follow?

A.—Secure turbosupercharger end section cover to turbosupercharger support.

1075-Q.—What should be done after the installation of the turbosupercharger end section cover?

A.—Apply adjoining sectional cover to frame; apply gasket compound between covers and set metal gaskets in position.

1076-Q.—What is the final operation?

A.—Tighten covers to frame, beginning at turbosupercharger end-working back towards generator. Replace items mentioned in Removal.

CAMSHAFT IDLER GEARS AND BRACKET

1077-0.—Describe the camshaft idler gears.

A.—The two camshaft idler gears, of hardened alloy steel, one for each bank of cylinders, comprise part of the gear train located at the generator end of the engine.

1078-Q.-What do these gears mesh with?

A.—These helical gears mesh with the split gear of the crankshaft and the drive gears of the camshafts.

1079-Q .- How are the idler gears supported?

A.—Each idler gear is individually supported by a bracket to the engine cylinder block Figs. 1 and 5.

REMOVAL

1080-Q.—What should be the first operation for removal of camshaft idler gears and brackets?

A.—Remove cylinder heads and liner assemblies 6R and 6L (on 12 cylinder engines) or 8R and 8L (on 16 cylinder engines.)

1081-Q .- What should be removed then?

A.—The camshafts and camshaft gears.

1082-Q .- What should follow?

A.—Remove castellated nuts from ream bolts of idler gear brackets. Attach eye bolt to top of idler gear bracket and support with overhead cable through camshaft drive gear opening of generator adaptor.

1083-Q .- How are the bolts removed?

A.—Use ream bolt puller to withdraw bolts. Bolt at top backs out into cylinder space in cylinder block. The two lower bolts back out into crankcase.

1084-Q .- What action should follow?

A.—Pivot idler gear bracket so as to remove bottom of bracket and gear first from generator adaptor.

NEW DEVICES



Chenille journal box packing roll is available in all cotton or a mixture of wool and cotton.

Chenille Roll-Type Journal-Box Packing

A new medium for wicking and filtering oil in car journal boxes, developed by the Journal Box Servicing Corporation, Chicago, has been approved for use in interchange service, on a limited basis of 5,000 car sets, for the purpose of determining more extensive results in actual field operations. Chenille Roll-type packing is designed primarily to accelerate the flow of oil to the bearing through the use of selected varns made of cotton or a mixture of wool and cotton threads in the yarn. According to the manufacturer, laboratory tests have demonstrated improved capillarity and lower bearing temperatures, as compared to the ordinary waste-pack.

Yarn used in construction of the roll is formed into three-inch loops, and sufficiently twisted to give increased resiliency. Each of the yarn loops is sewn individually to a core made of a soft lamp-wick ducking. The ducking serves a three-fold purpose of holding the yarn loops in position and acts as an oil filter and wick.

Four or five rolls may be used to pack a journal box, depending upon the size of



The rolls when applied lie well below the journal center line.

the box. For the box packer, it is said that guess-work is eliminated and the chance of varied opinions and poor judgment considerably lessened by use of Chenille Rolls, as a specified number of rolls is required for each size journal box. Field tests indicate that cars may be repacked with less effort and consequently in less time, also more accurately.

During the summer of 1953, the Duluth, Missabe and Iron Range equipped 500 ore cars with the new type packing in one truck of each car and to date good results are reported. In extremely cold weather, the rolls continue to supply oil to the journals and resisted displacement by rolling. The summer performance was equally encouraging.

While the life of Chenille Roll packing is yet to be determined by service tests over a period of time, favorable results are expected since the rolls are designed to withstand service wear and a series of reclamations, with no loss of material.

which is applied by means of a bracket to the truck frame and has an adjustable feature in addition to automatic down feed of the stick through the center of the stick holder.

The Nalco Moly sticks are designed to supply dry lubrication, and thus not pick up dust, sand or other gritty materials that promote abrasion. Year long tests recently completed are said to show substantial reductions in flange wear on locomotives equipped with these lubricators.



Impact Recorder For Railroad Cars

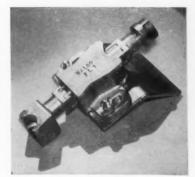
A single-directional recorder for checking the magnitude of longitudinal impact in freight or passenger cars has been developed by the Impact-O-Graph Corporation, Cleveland, Ohio. It may also be used in connection with incline impact testing. The instrument is designed for the rail carrier who is convinced that 90 per cent of damage to lading is result of end shock and that 3-directional instruments are therefore not necessary to secure this information.

The new model termed the RR will provide a continuous silent recording over a 28-day period. It weighs 11 lb. It is calibrated in mph and zones, and the stylus has a maximum deflection of 2½ in.



Nalco molybdenmum-disulfide sticks for use in the Nalco locomotive wheel flange lubricator shown in the angle mounting bracket at the left.

Chicago 38, utilizes molybdenum disulfide as a dry lubricant to prevent excessive wear of wheel flanges. A cast iron housing and stick holder, and molded Nalco Moly sticks comprise the lubricator assembly



Flange Lubricator

A new locomotive wheel flange lubricator, recently announced by the National Aluminate Corporation, 6216 W. 66th Place,

Silver Plate by Dip or Swab

A silver plating solution called Nusilver, which can be used for plating electrical contacts has been introduced by Walter G. Critchlow, 508 New York Street, Aurora, Ill. The silver may be applied by placing the part in the solution or by applying the solution to the part by means of a rag or swab. There are two types of (Continued on page 92)







at a cost of about 6¢ a mile

Figure it this way: If you have an older model Diesel locomotive with about 600,000 miles on it, you can have it modernized by Electro-Motive for approximately 6¢ per elapsed mile.

This price includes complete rebuilding of major components such as engine, generators, traction motors and control apparatus. And we do more than simply restore the original mileage. For in rebuilding worn components we incorporate many of the latest advances in design that go into current locomotive manufacture. Thus, every locomotive we rebuild leaves our factory a better unit than it was in the first place—with increased efficiency, higher capacity and longer useful life.

Through this program, F3 units due for 600,000-mile overhaul can be modernized—have the original mileage built back in—at little more than the cost of simply overhauling. And Electro-Motive's

policy of making improvements applicable to old models means you get back a locomotive that incorporates the latest standards of service life and maintenance reductions.

After full inspection of the locomotive, exact details of the work to be performed are agreed upon in a conference between your representatives and our Rebuild Staff. Range estimates are given, and the rebuilding of major components is billed in accordance with Electro-Motive's published flat-rate charges—charges that are the lowest you'll find anywhere!

All Electro-Motive rebuilds, whether complete locomotives or individual components, carry the same warranty as new units—in many cases, double the warranty they had in the beginning. If you'd like further information on any phase of our Rebuild service, write us or call in your local Electro-Motive representative.

Electro-Motive's Locomotive Rebuild facility at La Grange covers more than one-and-two-thirds acres. Many components are rebuilt on new locomotive production lines, as well as at five other strategically located Factory Branches.

The best locomotives are even better today!

ELECTRO-MOTIVE DIVISION GENERAL MOTORS

GENERAL MOTORS

NEW DEVICES

(Continued from page 89)

Nusilver, one for copper and brass and other non-ferrous metals and one for all-purpose uses. A cleaning agent is suspended in the solutions which serves to prepare the surface when applied by rubbing. The result is a thin coat of silver which adheres well to the surface to which it is applied.

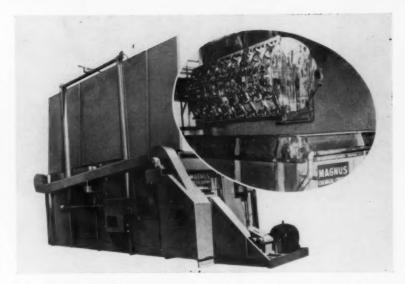
Freight Car Snubber

A Package Snubber, designed to smooth the way for fast freight car hauls with minimum lading damage has been introduced by The Frost Railway Supply Company, Detroit 26.

The device utilizes automotive brake lining as the friction material for snubbing action. According to the manufacturer, this gives better snubbing action with less-force, gives greater wear of friction surfaces, eliminates scoring, etc. It is reported that the unit will level oscillations approximately 85 per cent faster than the standard helical truck spring group.

The unit features an activating spring, made of centerless ground spring stee which has been shot-peened. It has a low operating stress which decreases the posibility of failure.

Freight cars can be quickly converted by removing the standard suspension spring group and slipping in the Frost to 95 per cent in time, labor and chemicals

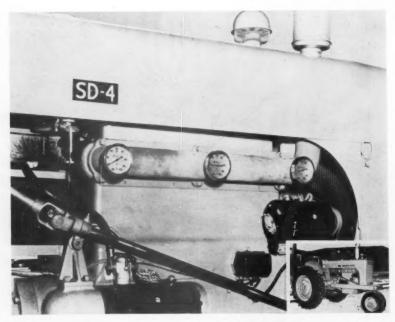


Mechanically Agitated Cleaning Machine

This device, with a rated capacity of 10,000 lb., was designed to clean a complete diesel block. Manufactured by the Equipment Division, Magnus Chemical Company, Inc., Garwood, N. J., it is a part of their line of Aja Dip diesel parts cleaning equipment.

According to the manufacturer, this method of cleaning or washing of diesel parts enables users to make savings up and obtain thorough cleansing. Time-consuming hand scraping, tank soaking and manual steam gun cleaning operations have been eliminated, states the manufacturer.

Parts being washed receive complete immersion in a detergent solution and are agitated vertically and horizonally 54 times per min. This agitation forces the detergent against all exterior and interior surfaces, shearing all soils and washing them to the outside of the part. package.



Diesel Engine Fuel Injection Tester

A method of checking fuel injection systems on diesel engines with bi-metallic, dial

type thermometers has been perfected by W. C. Dillon & Co., Van Nuys, Calif.

The thermometers are screwed into the exhaust manifold for the test. If all thermometers register equally, and if this temperature corresponds to standards, the

fuel pump is correctly calibrated. Otherwise, it must be adjusted to produce the proper amount of fuel.

By checking with thermometers and taking corrective action if needed, substantial improvements in fuel economy and operating performance can be gained.

These instruments are available in 32 standard models with stems up to 72 in. in length and in ranges from minus 40 to plus 160 deg. F up to 200-1000 deg. F. Dials are available for various combinations in 5, 3, and 2-3/8 in. outside diameter.

Dry Fire Extinguisher For Motors

The Ansul Chemical Company, of Marinette, Wis., reports that dry chemical can be used safely on electrical motors, without danger of abrasion. Tests on a dry chemical extinguisher made by this company were conducted by Power and Mine Supply Company Limited, of Winnipeg, Can.

Equipment used in the test was a 7½-hp, 550-volt d-c open type electric motor and two 4-lb Ansul dry chemical fire extinguishers. The d-c motor was chosen for the test, instead of an alternating current motor, because it was felt that any damage

(Continued on page 108)

CABOOSE CAR TRUCKS

BARBER-BETTENDORF

Swing Motion

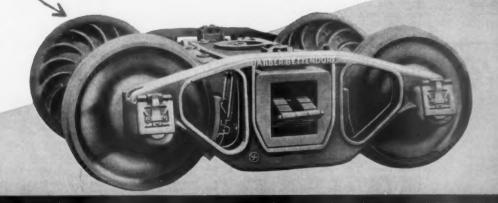
CABOOSE CAR TRUCKS

ANOTHER OF THE FINE TRUCKS CAST BY

SCULLIN



NEW YORK CHICAGO BALTIMORE RICHMOND, VA



SCULLIN STEEL CO.

SAINT LOUIS 10, MISSOURI

NEWS

UP Passengers Cars— A Correction

The 25-kw genemotors for the chair cars, sleeping cars, and kitchen cars for the Union Pacific described in the April issue of Railway Locomotives and Cars, beginning on page 51, were furnished by the Safety Car Heating & Lighting Co. Safety also furnished the 4-kw generators for the baggage cars and the 10-kw generators for the postal-mail-storage cars. The 60-cycle motor alternators for furnishing power for the fluorescent lamps are of 2,000 watts each, not 1,000 watts as stated in the article.

Great Northern Taking a Critical Look at Its Electrification

An extensive study of its electrified train operation will be undertaken by the Great Northern beginning May 20. The railroad operates 74 miles of line by overhead electric power between Wenatchee, Wash., and Skykomish, including the Cascade tunnel. Diesel-electric power is used both east and west of this electrified zone.

The GN indicates that the study will seek answers to questions revolving about all-electric versus diesel-electric operations in the territory, with emphasis on relative costs, and the findings will determine whether any operating changes will result. Several possibilities are being studied. One is to eliminate the electrified zone entirely, and operate diesel power all the way through; another is to reduce the electrified segment to the actual length of the Cascade tunnel (7.79 miles); and a third is to extend the electrification westward to Gold Bar, 23 miles, or Everett, 52 miles, or Seattle, 84 miles distant.

The study is expected to take about a year and engineers of the railroad will work with those of several outside firms. They will study such factors of railway operating economics as relative costs of diesel-electric and all-electric locomotive and train operation in the territory. Another study involves costs and other phases of installation and maintenance of equipment required for the two types of motive power.

Railroad Club Essay Contest Closes October 1

The New York Railroad Club is holding its sixth annual essay contest "to encourage constructive thought about railroad problems by students of transportation and younger men in railroad employ." For railroad contestants, the subjects for essays are (A) What specific changes in railroad rates, service, handling or equipment are needed to maximimize the volume of railroad traffic and net earnings—how and why, and (B) Modern techniques—what contributions can they make (and how) to maximum efficiency and economy in the maintenance of equipment, maintenance of way,

stores, or accounting departments. "How does the intrinsic economy of railroad transportation compare with that of other agencies, and what steps are necessary (on the part of railroads and/or public authorities) to secure for the railroads that part of the nation's transportation work which they are naturally best fitted to perform?" is the subject suggested for college students.

Details concerning the essays, can be obtained by writing to C. T. Stansfield, execu-

tive secretary, New York Railroad Club, New York 7.

The first prize is \$750; second prize, \$500, and third prize, \$250.

ODT Would "Mothball" Passenger Cars

The Office of Defense Mobilization, Defense Transport Administration, "is now (Continued on page 96)

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Month of February		2 months ended with February		
1954	1953	1954	1953	
6,688	11,921	14,571	25,410	
29,210	28,051	60,475	58,247	
614	710	1,237	1,422	
36,587	40,736	76,429	85.193	
3 206	3 522	9 961	2 140	
		1 685	3,160 1,728	
010	4921	1,000	1,120	
12,542		27,509	44,294	
2,499	5,495	5,123	11,220 160,898	
80,353		3 716		
07 796		202 116	3,949 $220,747$	
91,120	100,100	202,110	220,141	
1.02	1.03	1.02	1.03	
40.50	40.90	40.20	40.30	
24.00		23.60	22.00	
64.50	62.80	63.80	62.30	
	2,829	2,838	2,812	
	1,273	1,252	1,267	
31.00	31.10	31.20	31.50	
60 00	70.60	60 80	70.10	
09.90	10.00	09.00	10.10	
18.90	18.30	18.80	18.30	
			50.851	
146				
42.20	45.10	41.40	44.40	
	43.00	39.40	42.40	
784	872	772	862	
70 TO	45 -0	E0 E0	47 00	
55.70	47.00	33.70	47.20	
. C. C. M-2	13)			
0 100	4 510		0.000	
2,438	4,510	3,334	9,875	
19,119	18,240	2 910	38,533	
22 880	24 216	48 562	3,117 51,526	
22,000	27,210	10,002	01,020	
227,975	242,642	485,985	518,756	
12,588	25,223	27,788	54,682	
7,285	14,264	16,283	32.398	
193,222	180,043	410,373	396,599	
9.59	9.73	9.65	9.79	
C.C. M-215)				
322	567	695	1,208	
52	110	105	228	
3,084		6,405	6,557	
3,469	3,831	7,228	8,039	
			45	
4			12	
238			508	
280	295	597	630	
4 90	6.40	4 00	6.40	
15.30			16.30	
14.60	14.70	14.40	14.60	
12.50	12.80	12.30	12.80	
			3 00	
1 73	1.72	1.75	1.75	
1 73				
1.73 0.76	1.72 0.75	1.75 0.76	0.75	
	1954 6,688 29,210 36,587 1,386 818 12,542 2,499 80,553 1,873 97,726 1,02 40,50 24,00 64,50 2,860 1,260 31,00 69,90 18,90 53,494 42,20 40,20 784 53,70 C. C. M.2: 2,438 19,119 1,323 22,880 227,975 12,588 19,225 193,222 3,084 3,469 326 4238 4238 49,90 15,30 49,50	1954 1953 6,688 11,921 29,210 28,951 36,587 40,736 1,386 1,533 818 1,533 818 1,533 821 12,542 20,533 2,499 5,495 80,553 77,999 1,873 2,016 97,726 106,136 1,02 1,03 40,50 40,90 24,00 21,90 64,50 62,80 2,809 1,260 1,273 31,00 31,10 69,90 70,60 18,90 18,30 53,494 51,217 42,20 43,00 784 872 53,70 47,00 C. C. M-213) 2,438 4,510 19,119 18,246 1,333 1,460 784 872 53,70 47,00 C. C. M-213 2,438 4,510 19,119 18,246 1,333 1,460 1,333 1,460 22,880 24,216 227,975 242,642 12,588 25,223 7,585 14,264 133,222 186,643 9,59 C.C. M-215) 3,084 3,132 280 295	Month of February	



Then...and now...serviced with

Esso Railroad Products

Valuable years of experience in research and development, along with continual testing on the road and in the lab, stand back of the outstanding performance of famous Esso Railroad Products.

Diesel Fuels
ESSO ANDOK Lubricants—
versatile greases
ARACAR—journal box oils
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ESSO XP Compound-hypoid gear lubricant DIOL RD-Diesel lube oil COBLAX-traction motor gear

lube
VARSOL—Stoddard Solvent
SOLVESSO—Aromatic solvent
ESSO Weed Killer
ESSO Hot Box Compound
AROX—pneumatic tool lube

CYLESSO—valve oil
ESSO Journal box compound
Asphalt
Cutting Oils
Rail Joint Compounds
Maintenance of Way Products
Signal Department Products
RUST-BAN—corrosion preventive

RAILROAD PRODUCTS

SOLD IN: Maine, N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Md., D. C., Va., W. Va., N. C., S. C., Tenn., Ark., La.

ESSO STANDARD OIL COMPANY — Boston, Mass. — New York, N. Y. — Elizabeth, N. J. — Philadelphia, Pa. — Baltimore, Md. — Richmond, Va. — Charlotte, N. C. — Columbia, S. C. — Memphis, Tenn. — New Orleans, La.

NEWS

(Continued from page 94)

working with interested government agencies to develop a program which will assure that cars suitable for military and essential civilian traffic in an all-out emergency will not be scrapped as a result of purchase of new passenger-carrying equipment."

As to the latter, Administrator James K. Knudson of DTA has been advocating a plan whereby railroads would modernize their passenger service by acquiring new cars to replace old cars, which would then be "mothballed" and held for service in case of national emergency (Railway Age, January 18, page 27).

A fleet of approximately 650 heavyweight sleeping cars may be among the first to go into storage under arrangements now being worked out between the Pullman Company and government officials, About 75 of the cars are railroad owned, and the remainder are Pullman owned. The sleepers would join a group of tourist cars already in government storage.

Commenting on accelerated amortization arrangements which have now been extended to railroad passenger cars, the ODM said that the number of passenger cars owned by Class I railroads and the Pullman Company decreased from 29,000 to 22,300 during the 1944-1954 decade. Seating capacity of the fleet dropped nearly 25%-from 1,700,000 to 1,300,000.

SUPPLY TRADE NOTES

T-Z RAILWAY EQUIPMENT COM-PANY-Walton R. Collins, 90 West street, New York 6, has been appointed exclusive eastern sales representative.

BECK & BLATCHFORD, INC .- Karl T. Nystrom has been named vice president at Chicago.

UNION ASBESTOS & RUBBER CO. Albern Universal Limited has been appointed distributor of "Unarco" heating and airconditioning units at Toronto.

BRANDON EQUIPMENT COMPANY. T. E. McDowell, vice-president-research and development of the Pyle-National Company, has been elected vice-presidentengineering of the Brandon Company, at Chicago.

VAPOR HEATING CORPORATION .-James G. Eliasek, sales engineer at Richmond, Va., has been appointed district

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE MAY ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	No. of units	Horse- power	Service	Builder
Maine Central Western Maryland	. 41 42 21	1,000 1,750 1,600	Road switching	American Locomotive Electro-Motive American Locomotive

FREIGHT-CAR ORDERS No. of cars .. 423 .. 104 .. 1005 Type of car 100-ton gondola. Builders
Company shops
Pullman-Standard
Company shops
Pullman-Standard
Company shops
Pullman-Standard
Company shops
Pullman-Standard
Company shops Ruilder Aliquippa & Southern.
Chiongo & Eastern Illinois.
Fruit Growers Express Co.
Green Bay & Western.
Louisiana & Arkansas
Missouri Pacific.
Union Pacific. 50-ton box...... 70-ton refrigerator. Cabooses.
70-ton pulpwood.
50-ton flat.
Covered hopper.
50-ton tank. Union Pacific..... Union Tank Car Co.

PASSENGER-CAR ORDERS Missouri-Knasa-Texas 100 Coach 17ype of car Builder

1 Delivery scheduled for September. Cost. \$103.54 each.
2 The 1.750-hp units delivered; the 1,600 hp. units, one to be equipped with a steam generator, scheduled car Builder
.....Pullman-Standard

The 1,750-bp units delivered; the 1,600 bp. units, one to be equipped with a steam generator, scheduled for delivery in August.
 Estimated cost, \$210,000. Construction expected to be completed this year.
 Estimated cost, \$7.750 each. Delivered in May.
 To be all-purpose mechanical type. Construction expected to begin next January.
 Cost, \$24,300. The company has acquired a Giddings & Lewis carwheel and diesel locomotive tireboring mill at a cost of \$54,000.
 Estimated unit cost, \$6,300. Delivery scheduled for third quarter of this year.
 Construction scheduled to begin in September.
 PS-2 type, to cost approximately \$1.2 million. Scheduled for delivery this month.
 To be of stainless steel.

NOTES:

New York Central.—The NYC is considering the purchase of 62 additional diesel switching units for yard operation. The road also plans to request bids for construction of airconditioned multiple-unit coaches on two bases: For a lot of 50 cars and a lot of 100 cars. The cars would be similar to 100 air-conditioned coaches acquired by the road in 1950 and would go into commuter service in the New York suburban area.

Railway Express Agency.—This agency is inquiring for 300 to 600 50-ton refrigerator cars for passenger-train service.

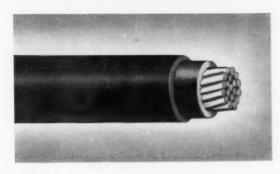
SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight account hot boxe		ion terminals		Miles per hot box our set off betweendivision
	car mileage (total)	System	Foreign	Total	terminals
August, 1950	. 2.937.455,020	7,422	15,490	22,912	128,206
September, 1950	2.974.297.739	6,541	12,881	19,422	153,141
October, 1950		4.343	8.935	13,278	238,439
November, 1950	2 868 871 913	2,536	5.331	7.867	364,672
December, 1950	2 813 042 212	2,278	5,968	8,246	341,140
January, 1951.	2 840 847 511	2.870	8,436	11,306	251,269
February, 1951	2 425 226 454	4,528	14.063	18.591	130,452
March, 1951	3 063 173 942	3.667	10.078	13,745	
April. 1951	2 006 562 763	3.702	.8.914	12,616	
May, 1951	2 012 624 792	5.631	13.737	19,368	
June, 1951.	2 974 972 405	7.074	15,376	22,450	
July, 1951	2 769 020 005	8.886	18.823	27,709	
August, 1951		9,023	19.092	28,115	
September, 1951	0 005 570 545	6,472	13,565	20,037	
September, 1951	2,923,370,343	4,131	9.053	13,184	
October, 1951	3,110,490,093	2,022	4,405	6.427	457,368
November, 1951	2,939,303,144	2,130	5,398	7,528	
December, 1951	. 2,752,316,133	3,208		10,405	
January, 1952	. 2,824,298,630	3,208	7,197		
February, 1952	. 2,809,162,671	2,723	6,473	9,196	303,977
March, 1952	. 2,943,812,727	2,594	5,877	8,471	
April, 1952	. 2,766,313,714	3,826	7,759	11,585	
May, 1952	. 2,918,508,445	6,020	10,938	16,958	
June, 1952	. 2,672,512,889	8,466	14,495	22,961	116,394
July, 1952	. 2,575,298,912	10,566	15.833	26,399	97,553
August, 1952	. 2,924,917,122	11,658	17,535	29,193	
September, 1952	. 2,931,129,734	7,536	13,608	21,144	138,627
October, 1952	. 3,093,990,289	4,058	8,053	12,111	255,469
November, 1952	. 2,984,101,808	2,198	4,501	6,699	
December, 1952,	. 2,869,928,617	1,742	3,632	5,374	
January, 1953	. 2,828,906,282	2,219	4,123	6,342	446,059
February, 1953	. 2,625,563,462	2,111	4,059	6,170	
March, 1953	. 2,904,227,804	2,696	6,077	8,769	
April, 1953	. 2,850,752,648	3,383	6,435	9,818	
May. 1953	3.013.610.843	5,892	11,433	17,325	
June, 1953	2.926.001.360	8.537	15,296	23,833	
July, 1953	. 2,925.317.024	9.342	15,775	25,117	116,467
August, 1953	2.971.020.484	8,638	14,160	22,798	130,319
September, 1953	2.822.222.832	6.083	10.195	16.278	173,376
October, 1953.	3.042.558.922	3,863	6,493	10,356	
November, 1953	2.788.773.285	1.987	3.404	5.391	
December 1953	2 656 063 018	1.581	2,550	4,131	
Innuary 1054	2 583 485 918	3.082	3.797	6.879	
January, 1954 February, 1954	2 445 214 845	2.953	4.066	7.019	
rebruary, 1901	. 2,110,211,013	0,700	2,000		240,010

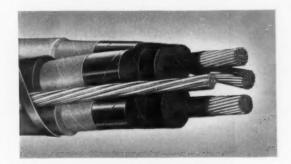
sales manager at Washington, D. C., succeeding Lou A. Richardson, who has been transferred to San Francisco. John J. Dempsey of the service department at Chicago succeeds Mr. Eliasek at Richond. Edward A. Panacek, sales engineer at Los Angeles, has been named assistant western district sales manager at Los Angeles, and Ray J. Vlaming, sales engineer at Jacksonville. Fla., has been transferred to Chicago.

NATIONAL ALUMINATE CORPORA-TION .- H. A. Kern has been elected to succeed the late A. Watson Armour as chairman of the board of directors. Mr. Kern will continue also as president. New senior vice-president is F. H. Thorne, who succeeds Wilson Evans, who is retiring but will continue to serve the Railroad Division in a consulting (Continued on page 98)





U. S. Grizzly Power Cable, 600 volts - Type RR single conductor, Hydrosec® - S heat- and moisture-resistant insulation, Neoprene jacket.



U. S. Grizzly Power Cable, 5.000 volts—Type RR

- 3-conductor, Uskorona®—ozone-resistant insulation—shielded—Neoprene jacket.

- 1. Lighter in weight than lead-sheathed cables and lead-sheathed armored cables.
- 2. Greater flexibility
- 3. Easier to handle during installation
- 4. Easier to splice, tap and terminate
- 5. More resistant to chemical corrosion
- 6. Unaffected by stray currents
- 7. Better protection against weathering
- 8. Longer life
- 9. Cost less
- 10. Made by United States Rubber Company, the only electrical wire and cable producer to grow its own natural rubber, make its own synthetic rubber and manufacture its own plastics

U. S. Grizzly Power Cables are used for general power distribution, and can be installed in conduits, underground ducts, buried directly in the ground, or installed aerially. Neoprene jacket protects against acids, alkalies, oils, and mechanical damage and weathering. (All IPCEA and NEMA specifications complied with.)

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UNITED STATES RUBBER COMPANY ELECTRICAL WIRE AND CABLE DEPARTMENT, ROCKEFELLER CENTER, NEW YORK 20, N. Y.



SUPPLY TRADE NOTES

(Continued from page 96)

capacity. J. L. Gibboney, vice-president, succeeds Mr. Evans as head of the Rail-road Division and director of export operations and foreign subsidiaries. Dr. D. G. Braithwaite, assistant vice-president, Catalyst Division, has been elected vice-president.

AMERICAN WHEELABRATOR AND EQUIPMENT CORP.—C. J. Osborn has been appointed district sales engineer at

Cleveland, and Dean T. Pournaras succeeds Mr. Osborn as district service engineer at Cleveland. John J. Savignac has been appointed district service engineer at Milwaukee. At Mishawaka, Ind., Robert E. Gallatin has been appointed district sales engineer, and Harold Groh, district service engineer to succeed Bruce Berger who has been transferred to the home office engineering department.

RUST-OLEUM CORPORATION.—Rust-Oleum recently opened its new and enlarged plant facilities in Evanston, Ill. PENNSYLVANIA SALT MANUFAC-TURING COMPANY.—Pennsalt has established two new operating divisions—the Industrial Chemicals and Chemical Specialties Divisions—which will function as complete operating units responsible both for the manufacture and sale of their respective products. Pennsylvania Salt Manufacturing Company of Washington, Sharples Chemicals Inc., and Pennsalt International Corporation already operate on this basis. William P. Drake, vice-president in charge of sales, has been named president of the

(Continued on page 100)



GASKET & JOINT SEALING COMPOUND

Makes all assemblies leakproof and pressure-tight!



BASIC BLENDS for every sealing requirement.

Heat-proof, non-solvent, will not shrink, crack or crumble.

Ask your distributor or write us for information

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Engineering experience is apparent in the smooth operation of the Johnston Car Bottom Furnace. Roller bearings in car and door hoist shafts, mechanical car seals, and power operated car pullers are just a few of many practical features. Johnston "Reverse Blast" low pressure burners for oil or gas assure clean, economical, efficient heat for annealing, normalizing, and stress relievings.

FURNACES

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JOHNSTON EQUIPMENT FOR THE RAILROAD

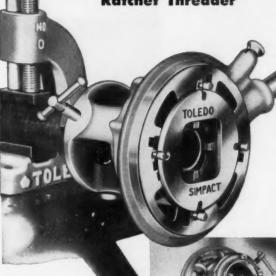
• Heat Treating Furnaces • Forging Furnaces
• Plate Heating Furnaces • Burners & Blowers
• Control Equipment • Rivet Forges • Heating
Torches
Over Thirty Years Experience in Design & Manufacture.



NEW

Improved **TOLEDO** Simpact

1" to 2" Self-Contained Ratchet Threader



- ★ Improved cam-type quick-ac-tion pipe holder has broader jaws for more positive grip
- ★ Free action cam assures instant setting to any size—1" to 2".
- ★ Easy to center . . . you get perfect aligned threads.
- * Fewer moving parts . . . minimum wear . . . light in weight. Amazingly compact . . will thread a pipe projecting through a wall as short as 61/4".
- ★ Accuracy proven through the years . . . dies recede along tapered steps. A fine quality tool—yet low in cost! Write

tapered steps. A fine quality tool—yet to for new catalog. Order through your sup-ply house. The Toledo Pipe Threading Machine Co., Toledo, Ohio. New York Office: 165 Broadway, Room 1310.

RELY ON THE LEADER . . . all the way!



HARDENED and GROUND for LONGER wear

EX-CELL-O PINS AND BUSHINGS

Keep your equipment out of the shop and on the rails with Ex-Cell-O steel pins and bushings. They give from four to six times longer service than ordinary pins and bushings. The tough ductile core of Ex-Cell-O pins and bushings withstands shocks, vibration; their hard case and fine finish resist abrasive action.

52-29

Standard styles and sizes of Ex-Cell-O pins and bushings for steam, Diesel, and passenger car equipment are given in the new Ex-Cell-O Bulletin 32428. Write today for your copy.

RAILROAD DIVISION

PIPE TOOLS.. POWER PIPE MACHINES EX-CELL-O CORPORATION

DETROIT 32. MICHIGAN



Manufacturers' Literature

Following is a compilation of free literature, pamphlets and data sheets offered by manufacturers to the railroad industry. Circle the number (s) on the coupon below to receive the information desired; the requests will be sent direct by the manufacturers.

- 1. WASHERS. H. K. Metalcraft Mfg. Co. 16-page folder "How To Save Time and Money When You Buy Washers" gives data and pictures on the manufacture and availability of both standard and special metal and fiber washers, contains data on washer characteristics, tolerances, and facilities to meet individual needs.
- 2. DRILL JIG BUSHINGS. Ex-Cello-O Corporation. New catalog "Ex-Cell-O Drill Jig Bushings" lists many bushings as now standard and carried in stock previously shown as specials, shows four groups of renewable bushings and liners, and includes a conversion chart.
- 3. ARC WELDING ACCESSOR-IES. Metal & Thermit Corporation. 20page illustrated catalog "1954 Welding Accessories Catalog" shows the M&T accessories line including electrode holders, helmets, eye shields, ground clamps, cleaning tools, gloves, and welding cable.
- 4. JACKS. The Duff-Norton Manufacturing Company. 40-page 2-color "Duff-Norton Jack Manual" explains how to select the right jack, lists the various types of ratchet, screw and hydraulic jacks, and gives complete specifications for each; it explains how to use, care for, and maintain jacks; it contains many safety hints.
- 5. INSULATING VARNISH. Irvington Varnish & Insulator Co. Catalog "Irvington Insulating Varnishes—Technical Properties and Methods of Application" contains complete data on all types of varnishes available; special feature section "How to Use Insulating Varnishes" contains special instructions on dipping, vacuum, pressure, brush, spray and baking types of application.
- 6. REPAIR CEMENTS. Smooth-On Manufacturing Company. 48-page pocket-sized booklet "Repair Handbook" shows in detail with drawings and illustrations methods for a wide range of repairs in the factory and home with Smooth-On repair cements; directory section describes the 12 repair cements and their jobs; table lists physical data of each.
- 7. STANDBY ELECTRIC PLANTS. D. W. Onan & Sons, Inc. 18-page technical bulletin T-011-B "Stand-By Electric Generating Plants and "Type AF and LT" Line Transfer Controls" covers the installation of emergency stand-by electric generating plants and automatic line transfer controls.

- 8. CEMENTED CARBIDE PROD-UCTS. Kennametal, Inc. 76-page general catalog #54 gives complete specifications and net prices of the Kennametal line of cemented carbide tools.
- 9. STORAGE BATTERY MAINTENANCE. The Electric Storage Battery Co. 8-page pocket-sized booklet "Seven Rules for maintaining your Exide Ironclad Battery" (Form #5063) on storage battery maintenance breaks down battery care to seven basic rules, each emphasized with catchy cartoon treatment.
- 10. 50 YEARS OF SERVICE. Spicer Mfg. Div. Dana Corporation. 40-page treatise "We've come a long, long way" is a brilliantly prepared pictorial analysis of the entire organization, showing its many divisions, plants, specific operations, and introduces the top management.
- 11. WELDING AND CUTTING. Air Reduction Sales Company. 32-page pocket-sized booklet "Safety" is specifially designed for welding and cutting operators handling oxyacetylene and arc welding equipment; it details rules for safety, handling and maintenance of cylinders, torches, regulators and hoses.
- 12. "AIR FOR YOUR ENGINE". Cummins Engine Company, Inc. 12-page 2-color Bulletin #16 deals with "Air For Your Engine" the subject of air and what to do about it, easy to understand, uses numerous illustrative cartoons.
- 13. CUSTOM WORK PLAT-FORMS. Ballymore Company. 6-page pamphlet describes all-steel portable and stationary platforms custom-fitted to each work requirement; ideal for many rail-road applications, it describes and shows many uses including large equipment repair, production operations, and maintenance.
- 14. INDUCTION MOTORS. Reliance Electric and Engineering Co. 12-page bulletin (B-2102) "Motor Selector" lists performance characteristics, construction features, dimensions, price, and other information essential in ordering.
- 15. SCREW MACHINE PROD-UCTS. Precision Products Div. The New Britain Machine Co. 16-page spiralbound brochure "Precision Screw Machine Products" describes and illustrates typical parts made, and the kind of facilities available at New Britain.

Reader Service Department Railway Locomotives and Cars 30 Church Street, New York 7, N. Y. Please send literature circled below: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 Also, please send me additional product information as follows: (company, product & page number) Name Title or Position Company Address City Zone State

SUPPLY TRADE NOTES

(Continued from page 98)

Industrial Chemicals Division, and Albert H. Clem, general sales manager, becomes president of the Chemical Specialties Diviof Pennsalt's manufacturing activities, has sion. William F. Mitchell, formerly head become vice-president in charge of engineering, purchasing, and traffic for the consolidated company.

GENERAL AMERICAN TRANSPOR-TATION CORPORATION. — Sam Laud, president, has been elected vice-chairman



W. J. Stebler

of the board. William J. Stebler, executive vice-president, has been elected president, and James S. Frey has been elected vice-president in charge of manufacturing. Herman Altschul assistant to the president,



H. Altschul

has been named vice-president in charge of freight-car sales; Frank E. Selz, vice-president in charge of the plastics division, and Spencer D. Moseley, assistant to the president.

INTERNATIONAL NICKEL COM-PANY OF CANADA, LTD. — Henry S. Wingate, vice-president and a director, has been elected president of International Nickel of Canada and to the presidency of the company's United States subsidiary, the International Nickel Company. Mr. Wingate succeeds Dr. Paul D. Merica.

SUPPLY TRADE NOTES

(Continued from page 100)

KELITE PRODUCTS, INC.—William Sovensen, vice-president in charge of the Atlantic division, has been named executive vice-president and R. C. Martin, sales director, vice-president, sales.

DAYTON RUBBER COMPANY—John Gabriel has been appointed railway division district sales manager, Central Territory,



J. Gabriel

with headquarters in Cleveland. Mr. Gabriel formerly handled railway sales for the Pennsylvania Salt Company.

AMERICAN LOCOMOTIVE COM-PANY.—Alco is leaving behind it the long years when it was a specialty company manufacturing only locomotives and is "well launched into the business of providing multiple products and services for a variety of expanding industries," Perry T. Egbert, president and new chief executive officer, told stockholders at the annual meeting in New York. The meeting was opened by Duncan W. Fraser, who is retiring as chairman of the board. Alco by-laws have been amended to make the president the chief executive officer.

In response to a shareholder's question, Mr. Egbert disclosed that Alco management is considering a change in the corporate name that would more accurately reflect the company's broadening product bases.

On May 11 Alco opened a new diesel locomotive parts warehouse and office at St. Louis for service to railroads in the southwest. The warehouse is a steel structure with asbestos-coated steel sheathing, 120 ft by 240 ft, with 30,000 sq ft of floor space. It is designed for palletization and other materials handling methods and has an inside receiving dock and an outside rail-loading area. Approximately 5,000 parts will be stored. Provision also has been made for later addition to the storage space and for the possible erection of a diesel engine and locomotive rebuild and repair shop. The offices, in the front of the building, are air conditioned.

On May 11 Alco also delivered its 10 millionth diesel horsepower, contained in a dual-purpose 1,600-hp road locomotive, to the Missouri Pacific. A plaque commemorating the event was presented by Mr. Egbert to H. M. Johnson, executive assist-

(Continued on page 104)





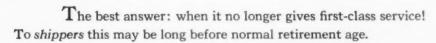
New Alco warehouse and office at St. Louis

When is really

5th YEAR



a Freight Car worn out?



The thing to watch for can best be described by a comparison of cold, hard figures. Compare the money you spend (in labor and parts) to keep a car running with the earning power of that car. After a while the economics speaks for itself. That's the time to seriously consider getting new equipment. The records of dozens of Leading Railroads prove that new equipment earns more money!

When it comes to 'running repairs', we're equipped to make spare parts by the ton — everything from nuts, bolts and brake shoes to car sides and under-frames quickly and economically. But, at the same time, we believe it's important to keep the 'economics' in mind before you repair or rebuild.

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Q.C.f.

CAR BUILDERS TO AMERICA'S RAILROADS

SUPPLY TRADE NOTES

(Continued from page 101)

ant to the chief executive officer of the MP. It was also the thirtieth anniversary of the delivery by Alco of the first commercial diesel unit—a 300-hp. yard switcher—to the Central of New Jersey. The switcher is still in use.

WESTINGHOUSE AIR BRAKE COM-PANY.—James A. Carlson, assistant to president, has been appointed assistant vice-president for sales coordination. Albert E. Dassonville has been named representative in the western district for the Air Brake Division at Chicago where he previously served in various capacities.



BOGUE ELECTRIC MANUFACTURING COMPANY plant opened recently at Pat-

erson, N. J. The plant, third largest established by the company in that city, has facilities for making equipment specifically designed for application in the railroad industry.

OAKITE PRODUCTS, INC.—George O. Whitesell, formerly system diesel supervisor for the Seaboard Air Line, has been ap-



G. O. Whitesell

pointed special railroad representative for Oakite. Mr. Whitesell will be located in Jacksonville, Fla.

FAIRBANKS, MORSE & CO. — J. A. Cuneo, general sales manager, has been elected vice-president, sales, and Robert B. Craig, assistant to president, has been



J. A. Cune

elected vice-president, with offices in Washington, D. C. Mario A. Gasque, assistant manager of Fairbanks, Morse de Mexico, S.A., Mexico City, has been appointed gen-



Paint more cars per day with A. F. I. Brand Finishes

Emporia Shop of the Santa Fe provides a fine example of modern paint shop methods.

A group of A.F.I. quick-drying freight car paints are used in the Emporia operation as well as in the shops of other railway lines.

The advantages of A.F.I. products for railway freight car painting are:

- 1. Higher output of cars per day
- 2. Proper film thickness.
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- 4. Higher gloss, cleaner cars.
- 5. Excellent durability.
- 6. Cleaner paint shop.

Numerous A.F.I. paint products for diesel locomotives, refrigerator and passenger cars are used by many other leading railroads throughout the country.

AUTOMOTIVE FINISHES, Inc.

Manufacturer of Automotive, Railroad and Industrial Finishes

8747 Brandt Ave. Dearborn, Mich. P.O. Box 457, N.W. Station Detroit 4, Mich. eral manager there, succeeding Paul A. Suess, transferred to the Los Angeles branch as manager. Alfred M. McLaren, formerly manager at Los Angeles, has been transferred to St. Louis, succeeding Cliff Schroeer, deceased.

LUNKENHEIMER COMPANY. - Melvin W. Pauly has been appointed general



M. W. Pauly



H. H. Layritz

manager of sales and Harold H. Layritz, assistant general manager of sales. Mr. Pauly was previously sales manager, eastern division, and Mr. Layritz, sales manager, central division.

OLIN INDUSTRIES .- Floyd G. Brimmel, district manager, Electrical division at Chicago, has been appointed assistant to sales manager, at New Haven, Conn.

GUSTIN - BACON MANUFACTURING COMPANY .- G. P. Oldham has been appointed general sales manager, succeeding F. H. Ebbert, vice-president, assigned to other executive duties. Mr. Oldham was formerly general marketing manager for Kaiser Aluminum & Chemical Corp.

ROBERTSHAW FULTON CONTROLS COMPANY .- Ogontz Controls Company. Philadelphia, has been appointed agent for distribution of railway equipment items for the Fulton Sylphon division of Robert-

shaw Fulton. The company will be headed by T. J. Kenny, who has been associated with the Sylphon control system for the past 20 years. Sheffler-Gross Company, Philadelphia, former distributor for Fulton Sylphon division has transferred its activities to the Ogontz Controls Company.

EQUIPMENT RESEARCH CORPORA-TION.—Paul A. Cavett, formerly western sales manager of the Ajax-Consolidated Company, has been elected vice-president of Equipment Research, at Chicago.

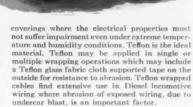
UNITED STATES STEEL CORPORA-TION, UNITED STATES STEEL SUPPLY DIVI- ston.-Hal P. Kibbey has been appointed assistant vice-president-sales. Named as district sales manager at that point is Clyde B. Colwell, Jr., who has been transferred from St. Paul. Mr. Colwell's successor is Earl L. Simanek, assistant district sales manager at Chicago.

FARR COMPANY.—Harold M. Robson has been appointed central division sales manager at Chicago.

UNITED STATES RUBBER COM-PANY .- Thomas B. Preston, sales engineer, mechanical goods division, has been transferred to Soto and East 46th streets, Los Angeles where he will take charge of

C-D-F TAPES of TEFLOM

- Heat Resistant up to 500° F.
- High Dielectric Strength
- Strong, tough, durable



Due to its non-sticking properties. Teffon is used extensively as a surface for heat sealing equipment.

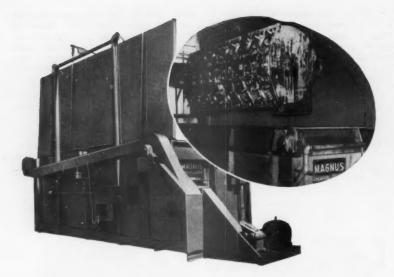
If you are not now using C-D-F Teflon tapes and want to know more about Teflon, the most promising of new plastics, write for Folder T-52 with samples. For technical assistance call your C-D-F sales engineer (offices in principal cities). He's a good man to know.

It is no longer necessary to spend time, effort and It is no longer necessary to spend time, effort and materials in frequent re-wrapping of field coils. Use C-D-F Teflon tapes for the job—they have unusually long service life. Tapes are easy to apply, easy to handle. Bolls are supplied in a wide range of widths and thicknesses either in 100% Teflon film or Teflon glass fabric supported.

Teflon has high heat resistance-withstands 260° C. (or 500° F.) without appreciably affecting its physical or electrical properties. It meets Class H AIEE standards for maximum hot spot insulation temperature of 180° C. Teflon has practically zero water absorption and its electrical properties are little affected after long exposure to high humidity. Its dissipation factor and dielectric constant are extremely low and unchanged over a wide range of frequencies







Cleans 10,000-lb. Diesel A-Frames in Two Hours!

A-Frame or block cleaning during overhaul of diesel engines is no longer a costly, time-consuming job for the diesel shops now using the Magnus Aja-Dip Cleaning Method shown above.

Previous to the Magnus Method, the blocks and pans were soaked 2 to 3 days in a still tank, then steam-cleaned by a crew of four men...a slow, costly production of a limited number of blocks per month.

With the Magnus Aja-Dip Method using Magnus Super Strip solution, it is now possible to completely clean and strip of paint a block every 2 hours. The parts are bare-metal clean for thorough inspection—a result not obtained by soak-and-manual cleaning procedures formerly used.

In addition to cleaning A-Frames, the Magnus Aja-Dip is also used for cleaning different ferrous metal parts such as liners, heads and other engine parts, again with worthwhile savings in time and labor costs.

> If cleaning is a costly problem in your shop, write for complete information on this Magnus Method.



Railroad Division

MAGNUS CHEMICAL CO., INC.

77 South Avenue, Garwood, N. J.

In Canada—Magnus Chemicals, Ltd., Montreal Representatives in All Principal Cities

SUPPLY TRADE NOTES

(Continued from page 105)

grinding wheels sales for the Pacific Coast. Mr. Preston was previously assistant to James A. Fairfield, grinding wheels sales manager.

NATIONAL MALLEABLE & STEEL CASTINGS CO.—T. K. Sanders has been appointed field engineer at the company's



T. K. Sanders

new Technical Center in Cleveland. Mr. Sanders had been engineer in charge of physical testing for the Association of American Railroads.

AMERICAN CAR & FOUNDRY CO.— The Shippers' Car Line Corporation, an ACF subsidiary, has been appointed exclusive sales representative for the sale of ACF-built tank cars and tank-car parts. John P. Krumech has been named vicepresident in charge of Shippers' sales; Robert S. Slater, vice-president, and Edgar F. Whitmore, Jr., assistant vice-president.

Obituary

LEROY KRAMER, retired vice-president of the General American Transportation Corporation, died April 10 in Chicago.

EARL L. TYNER, 58, sales engineer of Ex-Cell-O Corporation's railroad division, died in Detroit April 19.

PERSONAL MENTION

Atchison, Topeka & Santa Fe

E. G. SANDERS, fuel conservation engineer at Topeka, Kan., appointed motive-power assistant.

Baltimore & Ohio

L. S. BILLAU, electrical engineer at Baltimore, Md., retired on May 31, 1954. Career: Began in the test department of the General Electric Company at Schenectady, N. Y., where he specialized in the field of heavy electric traction. Became an



L. S. Billau

inspector in the electrical department of the B & O in 1908; assistant engineer in 1909; chief drafstman in 1910, assistant electrical engineer in March 1914, and electrical engineer on November 1, 1943.

Chicago, Milwaukee, St. Paul & Pacific

D. D. FISHER, car foreman at Council Bluffs, Iowa, appointed assistant district general car foreman, with headquarters at Western avenue, Chicago.

Missouri-Kansas-Texas

J. R. HAYDEN, superintendent car department at Denison, Tex., has retired.

GLEN O. PRIDEAUX, traveling car inspector, appointed superintendent car department at Denison, Tex.

New York Central

HARRY D. JOHNSTON, manager of (locomotive) power utilization, appointed superintendent at Buffalo.

CEDRIC S. HILL, assistant to manager power utilization, appointed manager of (locomotive) power utilization.

F. T. Kingston appointed assistant industrial engineer—equipment, with head-quarters at New York.

R. A. CARPENTER, chief road foreman of engines, electrical equipment department, appointed district road foreman on the general manager's staff at New York.

D. R. PATRIDGE, road foreman of engines, appointed chief road foreman of engines, with jurisdiction over the Electric, Harlem, Putnam and River divisions, and the New York Terminal district.

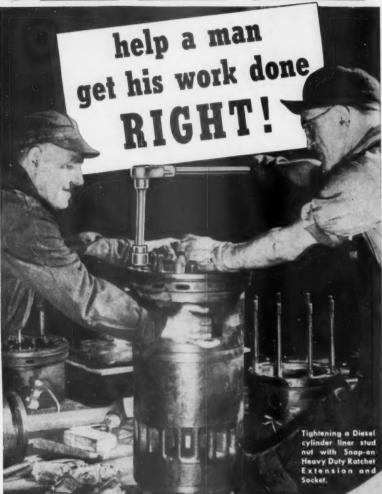
Northern Pacific

C. W. Hemsworth, chief draftsman, appointed assistant to general mechanical superintendent at St. Paul.

(Turn to page 108)



Snap-on Tools



• On the high iron, the highways and the high seas, Diesel maintenance goes faster, surer, with Snap-on Professional Tools. Stands to reason! Snap-on Tools are engineered for the tool-crib, instead of the store counter. For men to use, and use bard. They're husky where it counts most, slim and trim to reach into tight spots. Their toughness comes from core-to-surface tempering. They'll serve longer, cut your tool costs, cut down-time! Close-at-hand service to industry everywhere through 43 direct factory branches. Write for Snap-on Industrial Catalog and 104-page General Catalog.

*Snap-on is the trademark of Snap-on Tools Corporation.

SNAP-ON TOOLS CORPORATION

RAILROAD DIVISION 8130-F 28th Avenue Kenosha, Wis.



PERSONAL MENTION

(Continued from page 107)

W. R. VAN HOUSEN, assistant to general mechanical superintendent at St. Paul, has retired.

Southern

WILLIAM C. WILLIAMS appointed general foreman car department, Hayne shop, Spartanburg, S.C.

HENRY J. ELROD appointed general foreman car repairs at Macon, Ga.

HARVEY L. UNDERWOOD, JR. appointed assistant foreman electricians at Atlanta.

GEORGE A. FLOYD appointed foreman enginehouse, night, at Columbia, S. C.

JAMES N. HARLING appointed foreman enginehouse, day, at Columbia, S. C.

JAMES T. McGRIFF, Jr., appointed assistant foreman electricians at Atlanta.

NEW DEVICES

(Continued from page 92)

that might be incurred would show up better in it.

The motor was put into operation, and while running, the contents of one 4-lb extinguisher were emptied into it through both end bells. The armature fields, commutator, brushes, brushholder and all other parts were thoroughly covered with the dry chemical (which is specially-treated Sodium bicarbonate).

According to the report of the test, the motor continued to operate without any effect whatsoever, as normal ventilation carried off the excess dry chemical.

The motor was then stopped and the contents of another four-lb extinguisher were partially discharged into the motor. This time all ventilating slots in the armature were filled, the commutator was completely covered and the brushholder packed with dry chemical. After the motor was again put into operation, it performed as it did before the tests started.

When the motor finally was stopped, an air hose was used to blow the remaining dry chemical off and out of the motor, including the ventilating slots on the armature, fields, etc. This required about one minute.

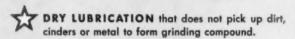
Representatives of the Winnipeg Electric Company and Winnipeg Hydro Electric System declared the motor would not require dismantling or overhauling, but that relubrication of the bearings would be desirable. There was no abrasive damage to the commutator. They also commented that use of an air line hose to blow the chemical out of the ventilating ducts would be sufficient servicing for those electrical motors containing ball bearings. On the other hand, for those motors using sleeve or roller bearings, it was suggested that the bearings be drained, flushed, and re-piled or greased, and that the balance of the equipment be blown off.

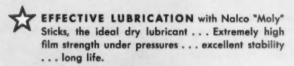
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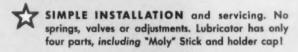
FLANGE LUBRICATOR

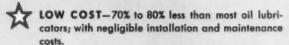


For the FIRST TIME:









Periodic replacement of "Moly" sticks constitutes about 99% of Nalco Flange Lubricator maintenance . . . assures you extended locomotive wheel life at a cost never before considered possible for effective flange lubrication.

"Moly" Sticks are molybdenum disulfide and a plastic carrier, molded to a controlled degree of hardness to get maximum lubrication effectiveness with longest life per stick. Tests on locomotive wheels in service indicate "Moly" Sticks far outwear the same-sized graphite sticks used for flange lubrication.

Ask for the Bulletin below for more cost-saving facts about Nalco Flange Lubricators—Or let your Nalco Representative give you the details.

More Data in Bulletin 541-Write Today

DUCT . . . Serving Railroads through Practical Applied Science

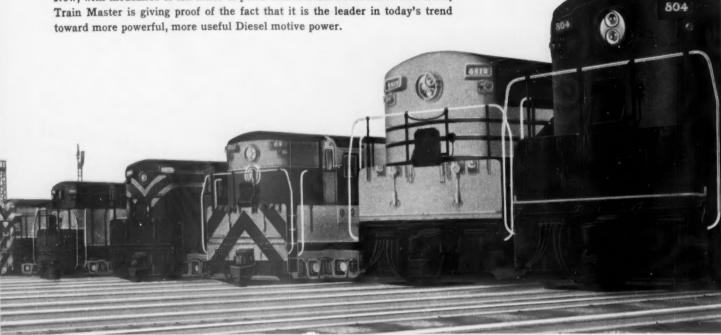
NATIONAL ALUMINATE CORPORATION

6190 West 66th Place

Chicago 38, Illinois
In Canada: Alchem Limited, Burlington, Ontario

Never before has a new design of locomotive won such wide and prompt acceptance! And this is acceptance measured in the only way that has meaning in the railroad industry—horsepower actually on motive power rosters.

Ever since the first units were purchased from blueprints, the Fairbanks-Morse Train Master has made a significant change in motive power planning. Now, with thousands of ton-miles of performance behind railroad-owned units, Train Master is giving proof of the fact that it is the leader in today's trend toward more powerful, more useful Diesel motive power.



TRAIN MASTER ...

BASIC ADVANTAGES OF...

VERSATILITY

Train Master's ability to do any job on the road and do it better than the power it replaces is an outstanding advantage in today's railroading. Because of this versatility, TM can carry any regular assignment—and protect all other jobs as well. This assures better service to shippers, for example, by hauling more tonnage on

faster schedules—and being able to handle terminal and transfer services as necessary.

Yes, check any service—Train Masters are regularly assigned to them all—and you'll find TM performance is unexcelled by any other locomotive on the rails today.

POWER

Heart of Train Master performance is the 2400 horsepower of the famous Opposed-Piston engine—the most reliable diesel engine in railroad service today. Unequaled in performance, the O-P engine has established a world-wide record for low maintenance. Its simple design, based on the 2-cycle principle, eliminates more than 40% of the moving parts found in other diesel engines. Eliminating the part eliminates the maintenance.

With the Opposed-Piston engine, rated at 200 horsepower per cylinder more than 10 years ago, the Fairbanks-Morse Train Master is the world's most powerful single-engine diesel locomotive.

... make TRAIN MASTER

your soundest motive power investment



...more than

2500000

HORSEPOWER in railroad ownership

Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Illinois



FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL LOCOMOTIVES AND ENGINES • RAIL CARS AND RAILROAD EQUIPMENT • ELECTRICAL MACHINERY • PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAMMER MILLS • MAGNETOS

TRAIN MASTER SPECIFICATIONS

MODEL

H24-66 2400 horsepower Road Locomotive.

POWER

1—12 cylinder Fairbanks-Morse Opposed-Piston 2cycle engine. Rated 2400 horsepower at 850 RPM.

TRACTION MOTORS

6 heavy-duty, high-capacity motors, each with separate blower.

TRAIN HEAT

4500 lb./hr. capacity steam generator.

SUPPLIES

Fuel oil	1800 gallons
Lubricating oil	385 gallons
Engine cooling water	250 gallons
Train heating water	2400 gallons
Sand	48 cu. ft.

DIMENSIONS

Over-all length	66' 0"
Over-all width	10' 41/2"
Over-all height	15' 0"
Over-all wheelbase	49' 4"
Wheel diameter	40" or 42"
Maximum curve with train	270

PERFORMANCE

Starting tractive effort at 30% adhesion	112,500
Max. short-time tractive effort (4 min.)	100,000
Maximum continuous tractive effort	
Max. speed 66 MPH	79,500
Max. speed 69 MPH	75,700
Max. speed 75 MPH	69,800
Max. speed 79 MPH	66,500
Dynamic Brake	
Horsepower at 20 MPH	3400 hp

63.000

Maximum braking effort



RUEMELIN SOFT GRIT BLAST

Clean your motor and generator armatures with a modern softgrit blast installation. This equipment quickly removes dirt and grease at lowest cost per unit. Eliminates use of solvents and resulting toxic fumes. This sanitary type room permits operator to stand outside blast compartment. Used by leading diesel engine overhaul shops. Names on request.

Write for literature and prices.

RUEMELIN MFG. CO. .

MFRS. & ENGRS. • SAND BLAST & DUST COLLECTING EQUIPMENT 3982 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

Does MANUAL BRAKE ADJUSTMENT

cost you real money every year?

Figure it this way...add up the timecosts for adjusting brake piston travel manually. Lost traffic due to terminal delays and yard congestion can be very expensive too. So any way you add it

up ... manual brake slack adjustment is costing you plenty every year ... and not one cent is necessary. Here's why:

Set it and forget it!

Franklin Automatic Brake Slack Adjuster automatically maintains correct travel of brake cylinder piston. Needs no adjustment or lubrication during the entire life of brake shoes. Completely automatic features make it "foolproof" against negligence and error. It is not affected by train shock or car dumping. You set it . . . forget it. The Franklin Automatic Slack Adjuster is the best money-saving, time-saving investment your railroad can make. It is easily and economically applicable to all types of freight cars . . . including hoppers. To get the facts . . . write for technical bulletin B-1201!



FRANKLIN BALMAR CORPORATION

Woodberry, Baltimore 11, Maryland Chicago Office: 5001 North Wolcott Avenue, Chicago 40, Ill.

NEW DEVICES

(Continued from page 108)



Cooling Control for Welding Rectifier

Provision for thermostatic control of cooling water is supplied on a new model, Size B Ignitron (WL-5551-A) available from the Westinghouse Electric Corporation, Pittsburgh, Pa. The control reduces cooling water consumption and provides protection to the tube and associated equipment in case of water failure.

The rectifier is a sealed, stainless-steel jacketed, water-cooled, mercury-pool tube. It is capable of replacing the standard model WL-5551 directly, with the advantage of provision for suitable thermostatic control. The calibrated thermostat, attached to the mount provided on the side of the tube, may be used to stop tube operation in case of insufficient water flow, or may be used with a solenoid water valve to turn cooling water on and off as needed.

The tube is designed primarily for resistance welding control. Two tubes normally used with single-phase welders will control 600 kva at 250 to 600 volts over a 25- to 60-cycle frequency range.

Diesel Fuel Additive

Railroads are now testing Nalco SR-158D, a new diesel fuel oil treatment, developed by the National Aluminate Corporation, 6216 West 66th Place, Chicago 38, to effect economies both in refinement and use of diesel fuel oil.

The utilization of a greater percentage SR-158D tends to prevent sludge formation that results in clogged lines, screens, filters and injectors in diesel locomotive fuel systems. The treatment is said to enable railroads to use effectively heavier oils and fuel oil blends, including those having a higher ratio of cracked to straight run fuels.

The stabilizing and dispersing action of of catalytically cracked oil leaves refiners

(Continued on page 116)

NATIONAL SNUBBER PACKAGES

give your old cars a smooth friction-controlled ride

Now you can equip your old freight cars with National Snubber Packages that operate on the same friction-control principle (with the same extra-large friction surfaces to reduce wear) as the National C-1 truck. The riding qualities of this outstanding car truck can now be obtained in the National Snubber Package.

This Snubber Package fits easily between narrow side-frame columns, and can be applied to approximately 90 percent of old non-friction-control trucks in service. With no pre-compression of wedge or load springs, the National Snubber Package can be inserted into the side frame by hand, much as a load spring cluster is applied.

You'll have more satisfied shippers and, at the same time, save dollars in damage claims and car and track maintenance, with old cars equipped for modern riding standards.



NATIONAL SNUBBER PACKAGE uses either AAR Alternate Standard 2½" deflection springs (coupler still remains below maximum permissible height of 3½") or 1936 AAR Standard 15½" deflection springs. The Snubber Package can be supplied with or without springs.

NATIONAL MALLEABLE CASTINGS COMPANY

Cleveland 6, Ohio

COUPLERS . YOKES . DRAFT GEARS . FREIGHT TRUCKS . SNUBBER PACKAGES . JOURNAL BOXES and LIDS

Technical Center
Citateland

"Progress through Research"

NEW FREEZER FREIGHT HI

200 new



NO HOT BOX PROBLEM! STREAMLINER SPEEDS!

NONSTOP RUNS! SMOOTHER, FREE-LATERAL RIDE!

EASIEST INSTALLATION! EASIEST MAINTENANCE!

Here's big news about modern railroading! . . . and here's a big step forward in a farsighted program to provide shippers of perishables with the finest rail service possible.

These new reefers help give shippers fast, economical, "on time" delivery. Mechanical refrigeration eliminates icing stops, and with Hyatt Roller Bearings at the wheels there are no costly delays for hot boxes. Also, because Hyatt's free-

lateral design greatly reduces jolting and jarring en route, spoilage is virtually nil—even on long runs.

But that's not all. Fruit Growers Express can also count on *lowest* possible operating costs. For Hyatt straight-roller journal boxes are easiest to install, easiest to inspect, and easiest to maintain.

Protect your investment in roller bearing freight cars. Specify Hyatts!



ROLLER BEAR

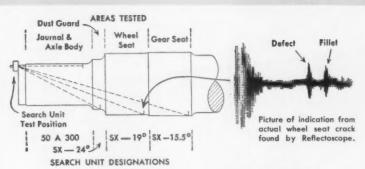
HYATT BEARINGS DIVISION & GENERAL MOTORS CORPORATION . HARRISON, NEW JERSEY

GHBALLING ON HYATTS !

FGE mechanical refrigerator cars equipped with Hyatt roller bearings



Now you can detect fatigue cracks in your diesel axles <u>WITHOUT DISASSEMBLY</u> with the Sperry Ultrasonic Reflectoscope



Cross section of typical diesel axle showing how the Sperry Reflectoscope with newly designed angle search units inspects all axle critical areas.

Here is a new, rapid, positive and economical method of inspecting critical areas of diesel axles for fatigue cracks during the lengthened intervals between truck disassemblies.

The Sperry Ultrasonic Reflectoscope, with new and specially designed angle search units, tests all high-stress areas *in place* in a matter of minutes.

One railroad alone has already examined 1000 diesel axles, found six that could have produced costly wrecks had they stayed in service to failure. Preventing even one minor accident will pay for the Reflecto-scope many times over.

Sperry Ultrasonic inspection can fit easily into your maintenance schedule. For further information or a working demonstration, write or wire us today.



Under-the-engine testing of your diesel axles is quick and thorough with the fully portable, highly accurate Reflectoscope,

Crack in dust guard fillet area, revealed in place by Reflectoscope, could have caused wreck had it progressed to failure.





SPERRY RAIL SERVICE

Division of Sperry Products, Inc. Danbury, Conn.

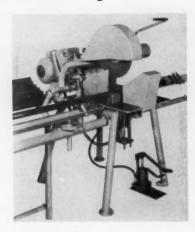
New York

Chicago

NEW DEVICES (Continued

(Continued from page 112)

more straight run stock for production of lighter fractions. At the same time it makes available a lower cost fuel oil which, after treatment with small amounts of SR-158D, may be safely and efficiently burned in diesel locomotives.



Abrasive Cut-Off Saw

This abrasive cut-off saw permits fast, square and practically burr-free cuts of tubular sections up to $4\frac{1}{2}$ in. outside diameter or equivalent shapes and solids up to 3 in. diameter.

Produced by Wallace Supplies Manufacturing Company, Chicago 14, its abrasive sheet, mounted on the ball bearing spindle, maintains alignment. The unit is powered by a 7½ hp. motor, with interchangeable V-belt pulleys to drive the 16 in. cutting wheel at proper speed for abrasive wheel or metal blade cutting.

Its tubular steel frame anchors to the floor. The motor is completely enclosed and the drive and cutting wheel are mounted on a ball-bearing pivot. Optional equipment includes several types of work holding safety devices depending on plant facilities and production requirements.



Explosion-Proof Motors

Maximum ratings available of U. S. horizontal totally-enclosed and explosion-proof motors have been increased to 150 hp.

(Continued on page 121)

What
do you know
about Dana?



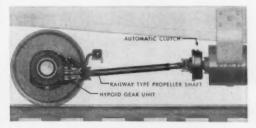
Charles A. Dana

THE RAILROAD INDUSTRY and the Dana Corporation have been closely allied for many years. For instance, a total of over 10,000 Dana-Made Spicer Generator Drives and Rail Car Drives are in use on more than 80 American and foreign railroads.

THE DANA CORPORATION had its founding in the Spicer Corporation in 1904. This company was formed by Clarence W. Spicer, inventor of the first commercially-produced automotive universal joint. Spicer Joints now are used as standard equipment on a majority of the world's au omotive vehicles. Today the Dana Corporation produces in its 10 modern domestic plants, and associated plants in Canada, Great Britain and France, the following products: transmissions, universal joints, propeller shafts, Brown-Lipe and Auburn clutches, forgings, axles, stampings, Spicer Brown-Lipe gear boxes, Parish frames, torque converters, power take-offs, power take-off joints, rail car drives, railway generator drives, aircraft gears, and welded tubing.

50 YEARS OF SUCCESS are behind the design and production of the Spicer Railway Generator Drive shown at the right. Write for illustrated literature giving details of this efficient unit, which is adaptable to old and new equipment.





The Spicer Railway Generator Drive is manufactured, sold and ENGINEERING serviced by DANA CORPORATION, TOLEDO 1, OHIO.

DANA

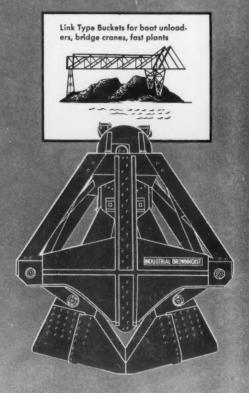
MANUFACTURING

DANA CORPORATION TOLEDO 1, OHIO

BROWNHOIST

ALSO BUILDS
BETTER BUCKETS





Brownhoist Buckets are designed for specific jobs and especially engineered to meet the toughest materials handling requirements. They take deep, full capacity bites that move more materials per lift, thus making possible considerable savings in man-hours and production time. They are built for endurance and dependability, the same qualities that have accounted for Brownhoist leadership in the bulk materials handling field for more than three quarters of a century. Railroads, steel mills and dock operators who are loading and unloading coal, ore, slag or other bulk materials will find it pays to discuss their requirements with Brownhoist engineers.

BROWNHOIST builds better cranes









IMDUSTRIAL BROWNHOIST CORPORATION - BAY CITY, MICHIGAN - DISTRICT OFFICES: New York, Philadelphia, Cleveland, San Francisco, Chicago; Canadian Brownhoist, Ltd., Mentreal, Quebec - AGENCIES: Detroit, Birmingham, Houston, Les Angeles

<u>clean</u> wood preservative controls decay_ protects Nickel Plate gondola decking





The Nickel Plate Road's gondolas and flat cars record impressive figures in heavy-duty ton mileage each month. This fast freight line uses car decking pressure-treated with clean PENTA* wood preservative to protect against decay and termites. This protection retards mechanical wear normally accelerated by hidden decay, saves money by cutting off-track time and lumber replacement costs.

Clean PENTA-treated wood keeps stock pens, chutes, platforms and

other structures fully serviceable much longer, too. And lumber that's pressure-processed with Penta is much easier to handle and store.

You'll want to include PENTA in your specifications for both new car construction and all repair lumber—for a greater return on every dollar invested. Get more information about clean *PENTAchlorophenol's long-lasting protection, measurable by chemical analysis: write today to the down chemical company, Midland, Michigan.

THE DOW CHEM	ICAL COMPANY
Dept. PE 755H	Midland, Michigan
Please send me:	

List of PENTA-treating plants.

Literature on car lumber treatment.

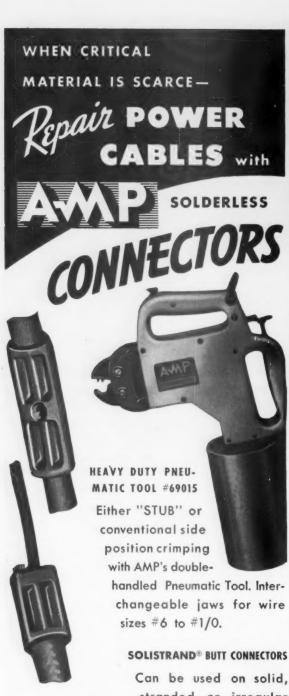
Name

Company

City_____ Zone___State___

you can depend on DOW CHEMICALS

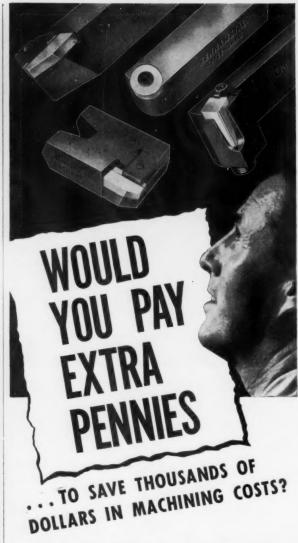
Dow



stranded or irregular shaped wire. These pure copper connectors make strong, vibration-proof permanent splices #22 to #4/0.



AIRCRAFT-MARINE PRODUCTS, INC.



Railroad shops can bore car wheels at as little as onetenth the previous tool cost . . . turn them in one-third the former time.* They're doing it with Kennametalin tool designs engineered to stand the gaff of railroad shop jobs.

A few pennies extra buys Kennametal instead of steel tools-and gives you the advantages of their design features, great strength, and long life which provide trouble-free tooling-easier set-up, fewer tool changes, reduced grinding time and trouble, fewer tools to stock.

In your shop Kennametal advantages may save thousands of dollars. Ask our district engineer to demonstrate. Kennametal Inc., Latrobe, Pa.



NEW DEVICES

(Continued from page 116)

Manufactured by U. S. Electrical Motors, Inc., the totally-enclosed motors, known as Type SD, are designed for protection against dirt, moisture, oil and chemicals. The explosion-proof motors, type SE, are for use where inflammable gases, volatile liquids or combustible dusts may be present.

Both type motors are double-enclosed with a built-in fan for full ventilation and greater heat dissipation. Additional features include asbestos-protected windings to withstand high temperatures; a stator cover plate which can be removed for inspection or cleaning; solid, a dynamically balanced, cast aluminum rotor; Lubriflush bearings for relubrication without disassembly; and normalized castings for permanent machining accuracy.

Both totally-enclosed and explosionproof motors are available from 1/3 to 150 hp. They may also be supplied in combination with Varidrives when variable speeds are desired, or on Syncrogears when geared multiplied torque is needed.



Pressure Type Fire Extinguisher

A single-cylinder pressure-vaporizing liquid type extinguisher said to be effective for all classes of incipient fires, particularly those occurring in electrical apparatus and inflammable liquids has been introduced by Pyrene Manufacturing Company, Newark, N. J., and is available in both 1 and 1½ qt. capacities. It features an on-and-off thumb lever mechanism that gives the operator finger tip control of discharge. A special locking device in the carrying handle prevents accidental discharge when stored.

The extinguisher is constructed of brass throughout and may be furnished with either a standard wall or clamping type vehicle bracket. Liquid is VL (carbon tetrachloride) or CB (chlorobromomethane).

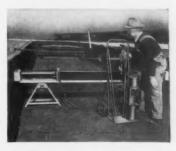


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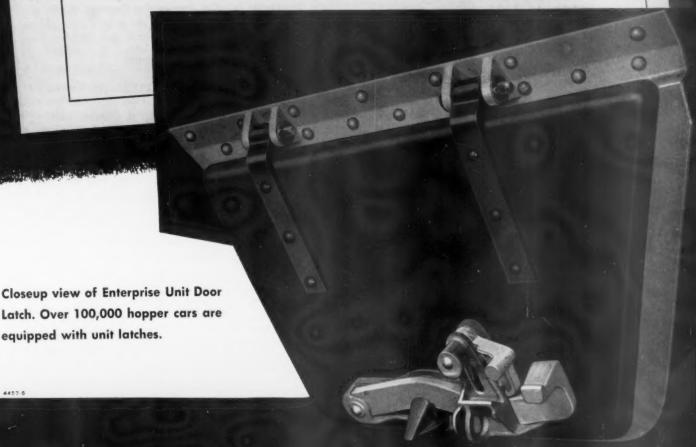
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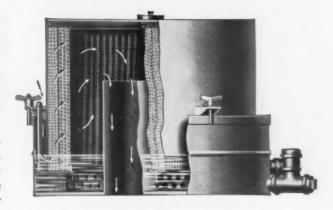
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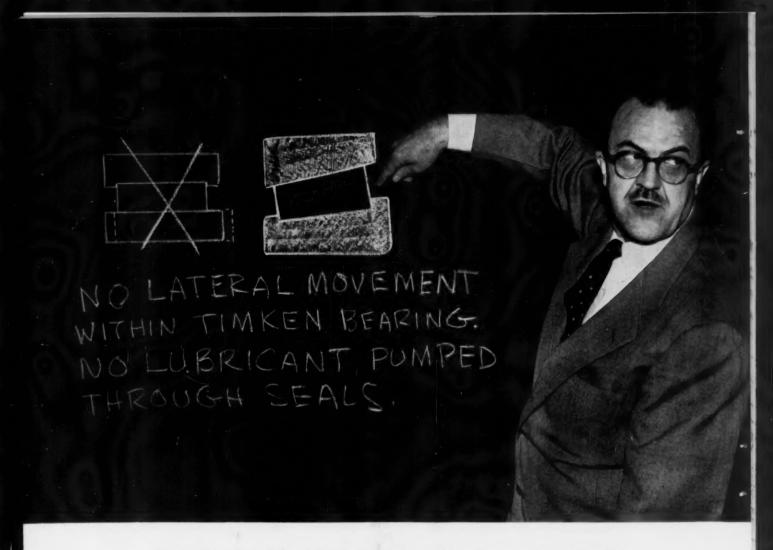
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Electromotive	1200	Switcher
Electromotive	2000	Rd. Pass.
Electromotive	2250	Rd. Pass.
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Electromotive	1500	Rd. Freight
Electromotive	1500	Rd. Switch.
Electromotive	800	Switcher
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Alco-GE	1000	Switcher
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